

Operations

NSBSP Administration Site and Central Mammography Booking

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NSBSP Navigation

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Introduction

The Nova Scotia Department of Health (DoH) established and funded the Nova Scotia Breast Screening Program (NSBSP) as a provincial program in 1991. All ten provinces and two territories now have breast screening programs. Evidence from randomized controlled projects has demonstrated that organized breast screening mammography maximizes the early detection of breast cancer.

NSBSP offers modified clinical breast examinations and breast health information at all operational sites. By August 2005, ten screening sites and six diagnostic sites were booking procedures and contributing real-time data through the provincial Central Mammography Booking Database (CMB). The database development was a priority of program set-up, and remains the key to program evaluation with ongoing improvements. In 2004 the number of NSBSP screens increased 8% from 45,002 in 2003 to 48,672. One screening site and one diagnostic site have plans to join the program in 2006.

From June 1991 until December 2004 there have been 324,745 screening examinations on 107,399 women registered in the NSBSP database. Cancer detection rates for this period are seen in Table 1. Of the mammography screening examinations performed in 2004, 33% were between 40 and 49, 35% between 50 and 59, 22% between 60 and 69 and 10% over age 70.

Table 1 Cancer Detection Rates

Age	Cancer Detection Rate per 1,000 Screens		Cancer Detection Rate Per 1,000 Women	
	1991- 2003	1991-2004	1991-2003	1991-2004
40-50	2.4	2.4	5.5	5.6
50-59	4.5	4.3	14.5	14.6
60-69	5.8	5.9	21.3	22.9
70+	9.3	9.3	33.7	35.8

Mission Statement

Mission Statement

The Nova Scotia Breast Screening Program's goal is to reduce the mortality from breast cancer in Nova Scotia women aged 50-69 years of age by 30% within ten years following development of a province wide screening program.

Vision

To provide quality standardized mammography access with timely assessment, informed patient navigation and appropriate follow-up of women who have abnormal mammograms on screening, through diagnostic work-ups in accredited work-up centers before consideration of surgical alternatives.

Nova Scotia Breast Screening Program (NSBSP) Organizational Chart – July 2004

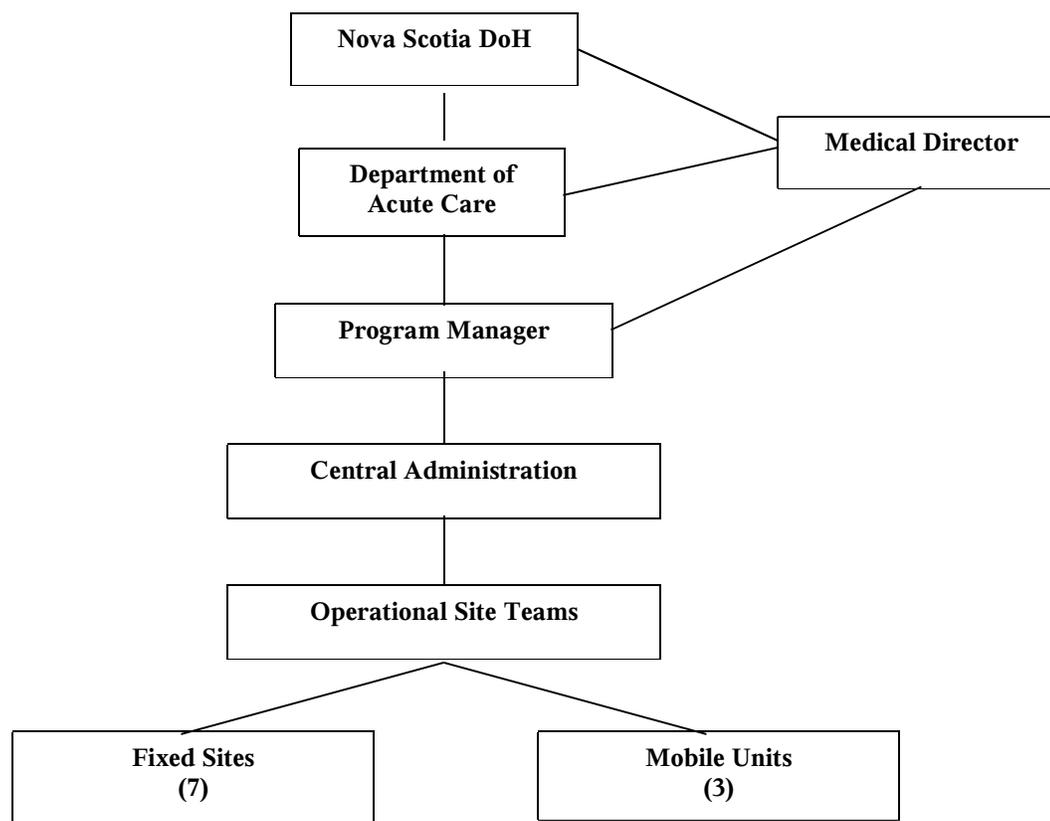


Table 2 Central Mammography Booking (CMB) Participants

	<i>Screening Sites</i>	<i>Participation date</i>	
<i>Mobiles</i> 3	<i>Mobile 1</i>	<i>Sept</i>	<i>1994</i>
	<i>Mobile 2</i>	<i>July</i>	<i>1997</i>
	<i>Mobile 3</i>	<i>Jun</i>	<i>2003</i>
<i>Fixed</i> 7	<i>Halifax Shopping Center</i>	<i>Jun</i>	<i>1991</i>
	<i>Sydney - hospital site</i>	<i>May</i>	<i>2000</i>
	<i>Yarmouth - hospital site</i>	<i>Apr</i>	<i>2001</i>
	<i>Truro - hospital site</i>	<i>Jun</i>	<i>2003</i>
	<i>Dartmouth - hospital site</i>	<i>Jan</i>	<i>2003</i>
	<i>Amherst - hospital site</i>	<i>June</i>	<i>2004</i>
	<i>Bridgewater - hospital site</i>	<i>July</i>	<i>2005</i>
<i>Diagnostic sites</i> 6	<i>QEII HSC</i>	<i>Dec</i>	<i>2000</i>
	<i>Sydney hospital site</i>	<i>May</i>	<i>2001</i>
	<i>Dartmouth hospital site</i>	<i>Apr</i>	<i>2003</i>
	<i>Truro hospital site</i>	<i>Apr</i>	<i>2004</i>
	<i>Yarmouth hospital site</i>	<i>Apr</i>	<i>2005</i>
	<i>Bridgewater hospital site</i>	<i>July</i>	<i>2005</i>

Strategic Planning

Provincial Program Model Approach

Within the Acute and Tertiary Care Branch the following provincial programs are currently funded by the Department of Health: Cancer Care Nova Scotia, Nova Scotia Diabetes Care Program, Reproductive Care Program, Nova Scotia Breast Screening Program, Cardiac Advisory Council, Nova Scotia Provincial Blood Coordinating Program and the Nova Scotia Hearing and Speech Program.

Although the concept of provincial programs has been in place in Nova Scotia's health system for many years, there has been confusion surrounding the program's accountability structure, its role and relationship with the Nova Scotia Department of Health.

The Acute and Tertiary Care Branch has developed an Accountability Framework for Provincial Programs to assist in determining whether a provincial program approach is the appropriate solution for particular health care issues related to acute and tertiary care. In addition, this accountability framework will provide support for existing Provincial Programs where reporting relationships, roles and responsibilities are not clear. *Provincial Program Model, Acute and Tertiary Care Branch Proposal, April 2, 2004*

Provincial Review of Mammography Units

In the interest of promoting an integrated approach to breast screening, several District Health Authorities (DHA 1, 2, 4, 8, and 9) have implemented NSBSP's screening and provincial diagnostic computer booking program. Discussions are currently underway with DHA 3 to integrate their fixed mammography unit with the program. The eventual inclusion of all fixed units with NSBSP will provide a more complete picture of mammography recruitment in Nova Scotia.

Similar to advances for other diagnostic equipment, there is new and updated technology available for mammography. Considering the new technology and the process of integrating all units plus the integration of PACS, it was considered timely to conduct a provincial review of all mammography units with the goal of developing a provincial plan for the future.

Provincial Mammography Review goals:

- review current mammography units in the province and identify a replacement plan and associated costs
- review the evidence supporting current and future technology and develop a plan for the province
- outline a process for the DHAs and the Department of Health to receive and review the plan developed
- consider the provincial approach to information management and improved technology

The review process and plan was completed in June 2005, and a provincial RFP was submitted for immediate purchase of equipment for Cape Breton and Yarmouth, some of which will be full field digital. This is the beginning of an organized long term approach (7 years) to introduce digital mammography to the province.

Core Business Functions

Population Health

Increasing the number of mammography facilities (capacity) and standardizing a mammography service province-wide to provide relevant research material for responsible health care reform

Database Surveillance and Evaluation

Providing quality assessment and provincial outcomes

Education

Promoting awareness of service availability, breast screening guidelines and the Clinical Practice Guidelines for the Care and Treatment of Breast Cancer

Mortality Rates

Decreased mortality of breast cancer requires early detection of the disease as well as prompt and appropriate treatment.

For 2005, it is reported that there will be an estimated 21,600 new cases of breast cancer and 5,300 deaths in Canada. In Nova Scotia for 2005, it is estimated that there will be 710 new cases of breast cancer and 200 deaths.

The estimated age standardized **incidence** rates for breast cancer in Nova Scotia for 2005 are **110/100,000**. The estimated age standardized **mortality** rate for Nova Scotia is now the second highest in Canada at **27/100,000 cases** (from highest one year ago). During their lifetimes, 1 in 8.9 women are expected to develop breast cancer, the most common cancer to afflict women, and 1 in 27 women are expected to die from it. Only 29% of breast cancers are diagnosed at age 70 or older, 50% between ages 50 and 69 and 21% under age 50. Actual data for age standardized mortality rates for breast cancer in Nova Scotia in 2001 was **26/100,000** and actual number of deaths recorded was **170**, both lower than predicted one year ago. In Canada in 2001 there were 95,000 Potential Years of Life lost due to breast cancer. *National Cancer Institute of Canada: Canadian Cancer Statistics 2005.*

On average, fourteen Nova Scotia women will be diagnosed with breast cancer every week. On average, four Nova Scotia women will die of breast cancer every week. *Canadian Cancer Statistics 2005.*

The most recent actual data for 2001 showed the breast cancer mortality rate in countries having organized breast screening programs to be at its lowest since 1950. Since 1993, incident rates for breast cancer have stabilized and death rates have declined. There is evidence for improved survival due to the organized mammography screening programs and advances in adjuvant therapies following breast cancer surgery. *National Cancer Institute of Canada: Canadian Cancer Statistics 2005.*

Nova Scotia Mammography Database Definitions:

Central Mammography Booking Database (CMB):

Includes (1) screening (2) and diagnostic booking and follow-up modules

- 1. NSBSP Database:** Includes self referred bookings for asymptomatic women ages 40 to 69 and over age 70 (if otherwise in good health): *The Canadian Association of Radiologist's Guidelines for Screening Mammography*.
- 2. Diagnostic Mammography Database (DMB):** An improved diagnostic database designed to integrate the NSBSP database with a diagnostic database and provide one provincially standardized diagnostic mammography reporting module with upgraded services. Presently it is in use at the Queen Elizabeth II Health Sciences Center (QEII HSC) in Halifax and Cape Breton Regional Hospital (CBRH) in Sydney.

Annual report production has been a significant outcome from NSBSP database development. This has resulted in yearly efforts to close the books on cases performed the previous year and has also provided many organized safeguards to help prevent women from falling through cracks in the healthcare system. Although this scenario does not occur often, it can and has been a devastating and costly experience for women.

Cumulative, annual and biennial figures and charts are contained in this report. Target age group numbers are used when calculating Program Indicators, but other charts and figures include women outside the NSBSP targeted age group. The NSBSP database ensures that every tenth mammogram has been blind read by a second radiologist. Participation, retention rates and abnormal call rates for this report were calculated from NSBSP database results collected June 01, 2005. Case follow-up and cancer detection data in this report were based on database information of July 31, 2005. At that time two cases reported as abnormal were not complete and three cases with unclear margins indicated on pathology reports were being monitored. In 2004 no women were classified as "Lost to follow-up", but three women with abnormal screening reports refused recommended follow-up procedures resulting in a status of "Refused".

From the beginning of the program in 1991, there have been 43 women "Lost to Follow-up" and 20 "Refused" recommended work-up procedures, and are therefore non compliant and appropriately categorized for the particular screening episode. These cases have been reviewed at NSBSP team approach rounds reviews and many have since undergone subsequent re-screening or diagnostic mammography.

Quality is the key word for successful breast cancer screening. Without a reliable database, the organization is extremely difficult. Providers of screening should insist that the program be well organized. If done properly, the cost-benefit analysis will reveal a reasonable cost per screen and cost per cancer detected.

Performance Indicators

In order to achieve reductions in breast cancer mortality and morbidity and to minimize the unwanted effects of screening, the delivery of organized screening must be of high quality. Performance measures and targets were selected on the basis of assessing program progress toward desired goals. The eleven performance measures met the following criteria:

- data for the measure was regularly available
- data available for the measure was of high quality
- meaningful targets could be defined on an evidentiary basis
- measures and targets would be useful for national comparison
- monitoring on an annual basis would be valuable
- each measure was widely accepted for use in program evaluation

A routine biennial report is produced at the national level using data from the Canadian Breast Cancer Screening Database (CBCSD). Although there are many differences in the manner in which the provinces have set up their individual programs, this monitoring role provides useful feedback and comparisons, as well as a mechanism to share processes and provide definitions. The targets set have provided goals and formats for the ten differently structured provincial breast screening programs in the interest of providing more standardized provincial data reports. In 2002, The Report from the Evaluation Indicators Working Group (a sub-committee of The Canadian Breast Cancer Screening Initiative) published the document “Guidelines for Monitoring Breast Screening Program Performance”. A list of eleven definitions and performance indicators for NSBSP for the biennial period of 2002, 2003 and 2004 can be seen on page 9. These are compared to Canadian Breast Screening Database Indicators, most recently available for the combined years of 2001 and 2002.

Accredited Sites

The Nova Scotia Breast Screening Program has as been instrumental in encouraging high quality mammography through accreditation of staff and equipment by the Canadian Association of Radiologists. As one of three provinces where screening mammography cannot be performed in a site which is not accredited or at least in the process of accreditation, NSBSP has taken a lead to promote this process. It is one of many organized steps towards achieving and maintaining favorable program indicators.

Table 3 Performance Indicators (ages 50-69)

Indicator	Canadian Recommendations	Canada		Nova Scotia	
		2001 & 2002	2002	2003	2004
• Participation rate	≥ 70% of the eligible population	34	35	38	43
• Retention rate	≥ 75% re-screened within 30 months	75	>80	>80	> 80
• Abnormal screen rate					
1 st screen	< 10% of screens are reported as abn	13.1	8.6	7.1	8.0
Re-screen	< 5 % of screens are reported as abn	7.4	4.5	4.3	4.1
• Invasive cancer rate					
1 st screen	> 5 per 1,000	5.0	6.7	3.9	5.3
Re-screen	> 3 per 1,000	3.9	3.7	2.8	3.1
• In Situ cancer rate	Surveillance and monitoring purposes	1%	1%	1%	1%
• Diagnostic Interval					
No open biopsy	≥ 90% within 5 weeks	69	83	80	75
With open biopsy	≥ 90% within 7 weeks	46	33	28	23
• Positive Predictive Value					
1 st screen	≥ 5% of abnormal screens (are cancer)	4.8	9.7	7.4	7.9
Re-screen	≥ 6% of abnormal screens (are cancer)	6.6	10.6	8.8	9.6
• Benign : Malignant biopsy rate	≤ 2 : 1 for ALL open biopsies	-	1 : 6.7	1 : 4.6	1 : 4.5
• Invasive ca tumor size*	> 25 % should be ≤ 10mm	36	42	33	39
• Node positive cancers	< 30% node positive	25	20	23	22

Participation Rate: Percentage of women who have a screening mammogram (calculated biennially) as a proportion of the eligible population (Page 10)

Retention Rate: Estimated percentage of women who are re-screened within 30 months of their previous screen (Page 14)

Abnormal Call Rate: Percentage of women screened referred for further testing because of abnormalities found within a program screen (Page 16)

Invasive Cancer Detection Rate: Number of women detected with invasive cancer during a screen episode per 1,000 women screened (Page 19)

In Situ Cancer Detection Rate: Number of women detected with ductal carcinoma in situ (DCIS) cancer (rather than invasive cancer) during a screening episode per 1,000 women screened (Page 19)

Diagnostic Interval: Total duration from abnormal screen to resolution of abnormal screen (Page 20)

Positive Predictive Value: Proportion of abnormal cases with completed follow-up found to have breast cancer (invasive or in situ) after diagnostic work-up (Page 21)

Benign to Malignant Open Biopsy Ratio: Among open biopsies, the ratio of number of benign cases to the number of malignant cases (Page 22)

Invasive Cancer Tumor Size: Percentage of invasive cancers with tumor size of ≤ 10mm in greatest diameter as determined by the best available evidence: 1) pathological, 2) radiological, 3) clinical (Page 24)

* (> 99% of tumor sizes input into NSBSP database are pathological)

Positive Nodes in Cases of Invasive Cancer: Proportion of invasive cancers in which the cancer has invaded the lymph nodes (Page 25)

Post Screen Detected Invasive Cancer Rate: Number of women with a diagnoses of invasive breast cancer after a negative screening episode per 10,000 person years at risk, within 12 and 24 months of the screen date (Page 26)

• Participation Rates

Percentage of women who have a screening mammogram (calculated biennially) as a proportion of the eligible population. Target: $\geq 70\%$ of the target population

Table 4 NSBSP Biennial Participation Rate and Trend by District ages 50-69

District Health Authority (DHA)	Target Population n	Participation Rates 2001+2002	Participation Rates 2002+2003	Biennial Screens 2003+2004	Participation Rates 2003+2004	Annual DHA Participation Trend
Unknown	-	3%	2%	2497	6%	
1 South Shore	7,555	20%	24.4%	2007	26.6%	Increase 2.2 %
2 SW Nova	7,241	34%	36.3%	3238	44.7%	Increase 8.4 %
3 Annapolis Valley	9,312	31%	29.3%	2676	28.7%	Decrease 0.6 %
4 Colchester E Hants	7,439	25%	47.9%	3864	51.9%	Increase 4.0 %
5 Cumberland	4,043	6%	12.4%	1033	25.5%	Increase 13.1%
6 Pictou	5,406	4.6%	9.3%	628	11.6%	Increase 2.3%
7 Guys/Ant	5,434	36%	36.1%	1960	36.1%	No change
8 CB	15,762	37%	36.9%	6152	39.0%	Increase 2.1%
9 Cap	38,114	42%	46.4%	19,406	50.9%	Increase 4.5 %
Invalid Code	-	-	-	6	-	
Total	100,306	34%	38% up 14%	43,467 up 12%	43.3%	Increase 4.5%

Over one year the biennial participation rate increased **4.5%** provincially, and it can be seen that in the same time-frame the number of screens increased by **12%**, compared to a **14%** increase one year ago. The lowest participation rate, seen in District 6, reflects a lack of database information from a site not presently booking mammography through Central Booking (CMB) or submitting data to the province. Similar lower rates can be seen for District 1, 3 and 5, all contributing little data to this report due to lack of participation in CMB. An **8.4 %** increase in participation in District 2 is due to increased appointment scheduling for Mobile 3 and a **13.1%** increased participation in District 5 can be seen following the affiliation of NSBSP with the Amherst Hospital as a fixed site contributing data for the latter half of 2004.

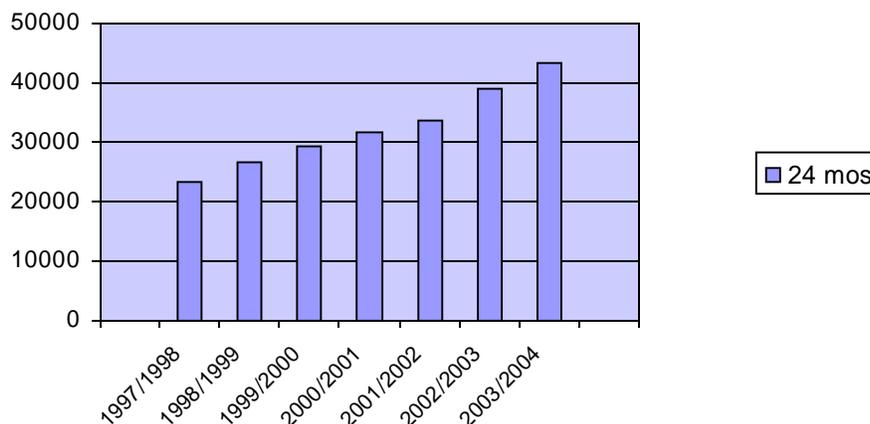
The most frequent “self-reported” reason for participation in NSBSP continues to come from recommendations for regular mammography screening by family physicians. This strongly supports the Program’s decision to focus promotional funding on increasing physician awareness of early detection by mammography screening and the associated cost benefit.

Overall, the highest participation can be seen in Colchester East Hants (DHA 4). This is probably due to the district having a fixed site while also administering a mobile unit which is based at the hospital during the winter months. This, plus the hospital’s decision to aggressively reallocate resources from diagnostic to screening, has resulted in a **51.9%** participation of the target age group in just three years. As also would be expected there are very high retention rates for the fixed site in Truro (95%) and for Mobile 3 (97%) as seen in **Figure 3**.

For the first year, in one district, a decreased participation rate has been noted. This is seen in DHA 3, where the Valley Regional Hospital does not provide data on hospital screening to NSBSP. Therefore this is not an accurate representation of the participation rate in this district as screening is also going on in the diagnostic sector.

Biennial participation rate trends are seen in **Figure 1** on page 11.

Figure 1 NSBSP Biennial Participation Rates (ages 50-69)



The commitment of the Nova Scotia Department of Health to the Nova Scotia Breast Screening Program has resulted in continued linear increases in participation rates since the start of Mobile 2 in 1997. Screens integrated from Mobile 3, Truro and Dartmouth in 2002/2003 resulted in the slightly higher participation rate for that year. This is also evident for 2003 and 2004, when complete year data from these sites and additional data from screens at the Amherst Hospital became available. Continued support given by the Department of Health in Nova Scotia toward provision of a truly comprehensive, provincial mammography program continues to be apparent in growing participation rates. For the two year period of 2003 and 2004, there were **43,467** (Table 4, Page 10) screening mammograms performed by NSBSP on women in the target age group.

In May and June 2005, the NSBSP administration office staff incorporated information from 5,000 mammogram requisitions from The South Shore Regional Hospital in Bridgewater (DHA 1) into the Central Mammography Database, enabling booking for both screening and diagnostics at that site to come on line July 04, 2005. Current consultations with The Valley Regional Hospital in Kentville (DHA 3) have resulted in a CMB start date at that hospital, now set for January 2006. A similar blitz to integrate mammography requisitions from that site is planned.

Nationally, planning is underway for the 2006 (spring) population census which will eventually reflect changing needs in the health care system. It is anticipated that the target-aged population in the Capital Health District (DHA 9) will continue to grow, resulting in longer wait times and increased appointment needs for both screening and diagnostic mammography in this district. Planning for a third mammography facility is strongly recommended to service the Sackville-Bedford area. This one

measure, plus implementation of standardized booking schedules for mobile facilities would assist greatly to increase provincial participation rates.

Table 5a Diagnostic and Screen Biennial Participation Rates ages 50-69

Diagnostic Mammography Facilities by DHA	Target Population	<i>Biennial Diagnostic Mammograms 2003+2004</i>	Biennial Screens Plus Biennial Diagnostics 2003+2004	Combined Participation Rates 2002+2003 Per DHA	Combined Participation Rates 2003+2004 Per DHA
Unknown	-	<i>1248</i>	3745	4%	4%
1 South Shore Regional	7,555	<i>68</i>	2075	>25%	>27%
2 Yarmouth Regional	7,241	<i>15</i>	3253	>36%	>44%
3 Valley Regional	9,312	<i>52</i>	2728	>30%	>29%
4 Colchester Regional *	7,439	<i>160</i>	4024	>49%	>54%
5 Cumberland Regional	4,043	<i>27</i>	1060	>13%	>26%
6 Aberdeen	5,406	<i>21</i>	649	>9%	>12%
7 St. Martha's	5,434	<i>47</i>	2007	>37%	>36%
8 Cape Breton Health Care *	15,762	<i>925</i>	7077	41%	>44%
9 QEII HSC and DGH *	38,114	<i>2385</i>	21,791	>51%	>57%
Invalid Postal Code	-	-	6		
Total	100,306	<i>4,948 (4%)</i>	48,415	>44%	>48%

Table 5a contains in addition to Table 4, diagnostic data from facilities now booking diagnostic mammography using the Central Mammography Booking Database. The diagnostic data presented in Table 5a shows **48,415** women having at least one bilateral mammogram in a two year period at either a screening or diagnostic site. The resulting mammography participation rate is **48%** (including **4%** of women in the target age group having had at least one mammogram outside the screening program).

Italicized numbers in column three, indicate numbers of women by DHA having had a diagnostic examination at a facility using CMB, but outside their home district. The three hospitals (*) contributing complete mammography data to Table 5a, all book through CMB and are effectively channeling appropriate screening cases to the program mode. The Yarmouth Regional Hospital (DHA 2) commenced booking their diagnostic examinations through Central Mammography Booking (CMB) in early 2005. The South Shore Regional Hospital in Bridgewater (DHA 1) commenced CMB booking in July 2005 and the Valley Regional Hospital in Kentville (DHA 3), is in the planning stage. Facilities in DHA 6 and 7 are not participating in CMB at this time. It is estimated that 10,000 mammograms are performed annually in sites where CMB booking has not been introduced.

Figure 2 Combined Provincial Mammography Participation Rates per DHA (ages 50-69)

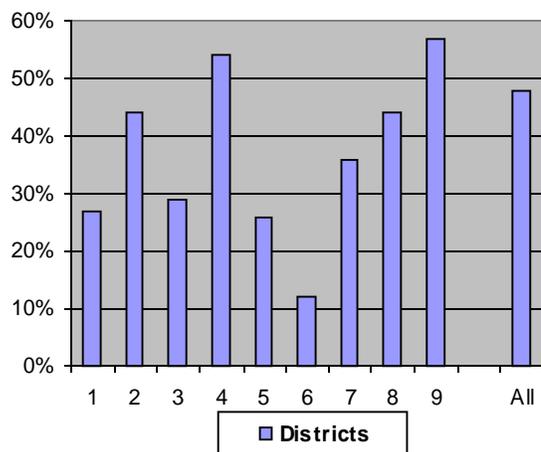


Table 5b Diagnostic and Screen Biennial Participation Rates ages 40-69

Diagnostic Mammography Facilities by DHA	Population (40-69)	Biennial Diagnostic Mammograms 2003+2004	Biennial Screens <i>Plus</i> Biennial Diagnostics 2003+2004	<i>Combined</i> Participation Rates 2002+2003 Per DHA	<i>Combined</i> Participation Rates 2003+2004 Per DHA
Unknown		3,340	7,388	(5%)	(4%)
1 South Shore Regional	12,634	99	2,848	>23%	> 22%
2 Yarmouth Regional	12,182	30	4,836	>36%	>39%
3 Valley Regional	16,007	71	3,807	>27%	> 23%
4 Colchester Regional *	13,532	276	6,597	>49%	>48%
5 Cumberland Regional	6,583	33	1,545	>13%	>23%
6 Aberdeen	9,246	32	1,019	>10%	>11%
7 St. Martha's	9,200	62	2,886	>34%	>31%
8 Cape Breton Health Care *	26,722	1,228	10,287	>39%	>36%
9 QEII HSC and DGH *	71,365	4,839	35,990	>50%	>50%
Invalid Postal Code		1	12		
Total	177,471	10,011	77,215	44%	>43%

Table 5b is similar to Table 5a except for the addition of ages of 40 to 49. This age group although not actively recruited, is accepted by NSBSP and is recalled on an annual basis for purposes of data collection and other benefits available only through the organized program. As expected, the combined provincial screening participation rate is lower (**43%**) than for the target age group (**48%**) seen in Table 5a. It is minimally lower than that reported last year (**44%**), reflecting perhaps results of the program's emphasis to recruit the target age group and the impact of the CMB protocol for the booking of diagnostic cases.

Table 6 NSBSP Biennial Participation and Cancer Detection Rate by District ages 50-69

District Health Authority (DHA)	Target Population	Women screened biennially 2003+2004	Participation Rate 2003+2004	Invasive Cancers	In situ Cancers	All Cancers	Cancer Rate
Unknown District	-	2,497	2.5%	3	1	4	1.6
1 South Shore	7,555	2,007	26.6%	6	7	13	6.5
2 South West Nova	7,241	3,238	44.7%	11	4	15	4.3
3 Annapolis Valley	9,312	2,676	28.7%	15	6	19	7.1

4 Colchester East Hants	7,439	3,864	51.9%	9	2	11	2.8
5 Cumberland	4,043	1,033	25.6%	7	0	7	6.8
6 Pictou County	5,406	628	11.6%	0	1	1	1.6
7 Guysborough /Antigonish	5,434	1,960	36.1%	8	3	11	5.6
8 Cape Breton	15,762	6,152	39.0%	35	4	39	6.3
9 Capital	38,114	19,406	50.9%	87	26	113	5.8
Invalid Postal Codes	-	6	-				
Total	100,306	43,467	43.3%	179	54	233	5.4

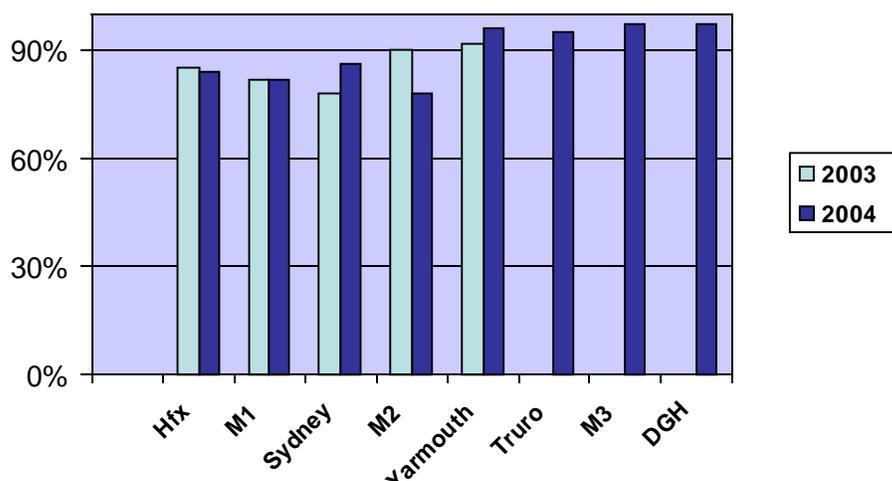
Of interest is the lower cancer detection rate (**1.6**) in DHA 6 where screening and diagnostic mammography is not booked through CMB. This cancer detection rate reflects results from the cases performed primarily by mobile mammography and those women from DHA 6 having screening outside of the district in which they reside. This particular rate is in no way representative of the actual rate, as it includes only a percentage of the cancers detected in DHA 6. This chart is intended to be of greater use when there is complete provincial Central Mammography Booking and sufficient mammography capacity.

- **Retention Rates**

Estimated percentage of women who are re-screened within 30 months of their previous screen

Target: $\geq 75\%$ re-screened within 30 months

Figure 3 2003 and 2004 Retention Rates by site and ages 50-69



The overall retention rate for NSBSP in 2004 remains above **80%**. Due to the short time some NSBSP sites have been involved (Truro, Mobile 3 and Dartmouth) higher retention rates are seen at these places. The higher retention rates at the Yarmouth site are possibly due to a greater number of screens recalled at yearly intervals (**Figure 4**). Retention at two sites, the Halifax Clinic and Mobile 2 has declined, probably due to increased wait times at the Halifax site and insufficient appointments available for Mobile 2 in 2004, problems which have recently been remedied.

In previous years, prior to the start-up of Mobile 3, Mobile 1 spent several months servicing mainland sites in addition to sites in Cape Breton. Due to extra services recently provided by the third mobile and taking into consideration the declining age of Mobile 1, 2004 became the first year it was possible to restrict Mobile 1 for use exclusively on the island. Due to a significantly higher target population in DHA 8 compared to that combined in DHA 4 and 5, mobile service redistribution is further being

considered. One positive plan would be for a second fixed mammography unit to be purchased for Cape Breton. It has long been known that NSBSP facilities and associated screening appointments are not as readily available for DHA 8 as they are on the mainland. This has been an escalating problem for women living in Cape Breton.

NSBSP retention rates for this report are based on the number of eligible clients who are due for their next appointment and have been sent a reminder notice, but have failed to book as of May 22, 2005. Due to fluctuating wait times, clients who have not booked but are still within three months of their due dates are not included, nor are previously diagnosed cases of breast cancer or test records. Clients deciding never to return are included. The program does accept women over age 70 for screening every two to three years, but does not send them reminder letters unless recommended by the radiologist to return for screening.

Figure 4 "Biennial Guideline Reporting" (ages 50-69)

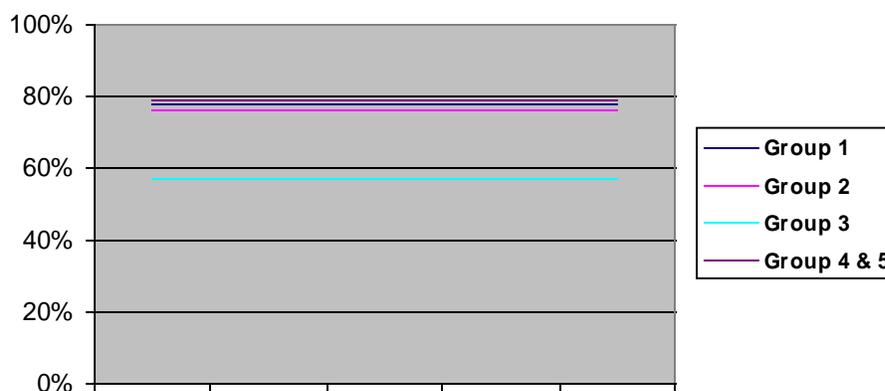


Figure 4 demonstrates that for the target age group, one imaging interpretation group recalls 57% of screening cases on a biennial basis, (as opposed to 33% in 2003). The positive trend may be due in part to the reduction in numbers of screeners at this one site, or attempts to follow the NSBSP screening guidelines more closely.

Despite more annual recalls in both 2003 and 2004, the same group had a lower cancer detection rate in 2003 and again in 2004 in comparison to other CMB groups more stringently following guideline reporting practices. It is possible in fact that with a higher rate of “annual recall-screening”, fewer early cancers are being detected. The four interpretation groups following guideline reporting have biennial recalls rates of 78%, 76%, 79% and 79%, marginally lower than one year ago. The cancer detection rates by the same reporting group are respectively 4.8, 4.1, 3.9 and 7.5. In an American study comprising eight screening studies, the interval at which mammography was performed was between 12 and 33 months and annual screening mammography was found no more effective than biennial screening mammography. *Breast Cancer Screening: A Summary of the Evidence for the U.S. Preventive Services Task Force; Annals of Internal Medicine, 2002, 137: 347-360.*

Abnormal Call Rate (%)

Percentage of women screened referred for further testing because of abnormalities found within a program screen
Targets : < 10% of 1st screens and < 5% of re-screens

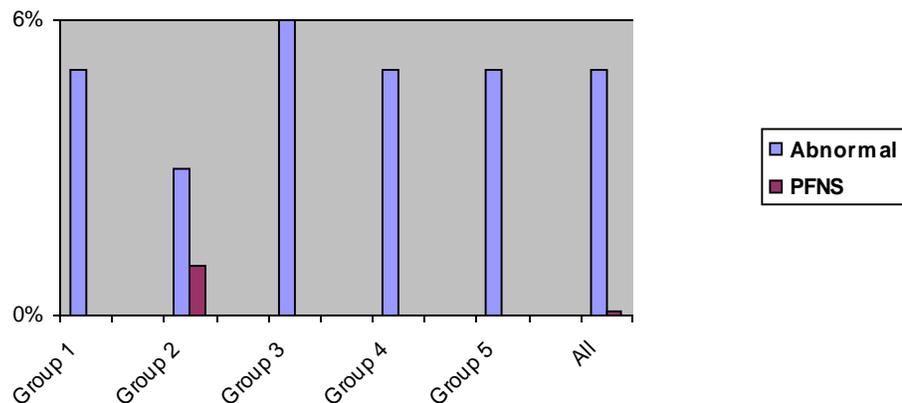
Table 7a 2004 Abnormal call rates and cancer detection rates (50-69)

	Screens	Abnormal Reports	Abnormal Call Rate (%)	Cancers	Cancer detection rate/1000 Screens	% of cancers from abnormal reports
1 st	5,480	443	8.0	35	6.4	7.9
Re-screen	22,000	904	4.1	87	4.0	9.6
All	27,480	1,347	4.9	122	4.4	9.0

Table 7b 2004 Physical finding not seen (PFNS) call rates and cancer detection rates (50-69)

	Screens	PFNS Reports	PFNS Call Rate (%)	Cancers	Cancer detection rate/1000 screens	% of cancers from PFNS reports
1 st	5,480	7	0.12	0	-	-
Re-screen	22,000	21	0.10	0	-	-
All	27,480	28	0.10	0	-	-

Figure 5 Abnormal and PFNS Recall Rates by Reporting Group 2004 (50-69)



In Nova Scotia, **1,347** (Table 7a) screens in the target age group were reported as abnormal. Abnormal reporting rates of **4.9%** overall (**8.0%** for 1st screens and **4.1%** for re-screens) are lower than reported nationally and have improved greatly from the start of the program. The highest rate (**6%**) is in group 3.

An additional **28** cases (Table 7b) were reported based on clinical findings categorized as Physical Findings Not Seen or “PFNS”. These have decreased from a total of 40 in 2003. Group 5 chose not to use the PFNS option as an interpretation result. Generally however, the “PFNS” reporting selection is being used, but the number of reports is minimal and not significant enough to reflect as a percentage in Figure 5. Group 2 had a higher percentage of PFNS reports when compared to groups 1, 3 and 4. No cancers were detected by clinical findings alone which were not visible on mammography. There was however, one clinical finding resulting in one cancer detection in the 40-49 age group which is not represented in the above chart.

Table 8 2004 Work-up Assessment (all ages)

Assessment Tests	All	Assessment testing per all abnormal screens	Assessment testing per all screens	1st	Assessment testing per abnormal (1 st screens)	Assessment testing per (1 st screens)
Work-up ultrasounds	976	36%	2%	483	43%	4%
Work-up mammograms	2589	95%	5%	1057	94%	9%
Core Biopsies	789	29%	2%	345	31%	3%
MRI	20	0.7%	0.04%	7	0.6%	0.06%
Women to surgery	260	10%	0.5%	94	8%	0.8%

Table 9a 2004 Core Biopsy Outcomes (all ages)

Outcome	1991-2004			2004		
	Stereo	U/S Guided	All	Stereo	U/S Guided	All
Benign	3,349	85	3,434	552	42	594
Atypical/Suspicious	285	5	290	30	0	30
Cancer	1203	58	1,261	173	22	195
Invasive	869	57	926	120	22	142
DCIS	332	0	332	51	0	51
Lymphoma	2	1	3	0	0	0
LCIS	7	0	7	2	0	2
Unsatisfactory	64	0	64	2	0	2
Others*	226	3	229	53	1	54
Total	5,134	151	5,285	810	65	875
Benign : Malignant**	2.8 : 1	1.4 : 1	2.7 : 1	3.2 : 1	1.9 : 1	3.0 : 1

*Includes unsuccessful and equivocal cases

**Results of atypia and LCIS are not included to determine B : M ratios

There were 4,941 women having 5,285 core biopsies through NSBSP from 1991 until 2004 (344 women had more than one core biopsy at different times or bilaterally). Additional information is shown in Table 9b. Of the 875 core biopsies performed in 2004, 65 were indicated as being done using ultrasound guidance for positioning of the needle.

Table 9b 1991-2004 Core Biopsy and Definitive Surgery Outcomes

Malignant cores benign at surgery	11
Malignant cores atypical or benign at surgery	7
Malignant cores malignant at surgery	1221
Malignant cores – no definitive surgery	29
Benign cores benign at surgery	205
Benign cores atypical or suspicious at surgery	21
Benign cores malignant at surgery	59
Benign cores – no definitive surgery	3149
Atypical or suspicious cores benign at surgery	63
Atypical or suspicious cores atypical or suspicious at surgery	89
Atypical or suspicious cores malignant at surgery	107
Atypical or suspicious cores – no definitive surgery	31
Unsatisfactory or others	293

Table 10 2004 NSBSP Surgical Outcomes by District Health Authority (all ages)

DHA	1	2	3	4	5	6	7	8	9	Unkn	All
Screening Exams	2200	3957	3298	3939	1261	609	1983	6973	21435	3017	48672
Surgical Procedures	20	29	18	32	11	1	8	30	122	23	294
Women to Surgery	19	26	16	28	9	1	7	28	108	18	260
B : M Ratio	1 : 1	1 : 0.9	1 : 4.3	1 : 3.5	1 : 7.0	1 : 0	1 : 6.0	1 : 27.0	1 : 6.4	1 : 8.0	1 : 3.9
Cancer Det Rate	4.1	3.0	3.9	5.3	5.6	0	3.0	3.9	4.2	5.3	4.1

Table 11 2004 NSBSP: Days to Diagnosis and Surgery Wait Times by District Health Authority (all ages)

DHA	1	2	3	4	5	6	7	8	9	Unknown	All
Screen to 1 st core biopsy (any result)	78	99	68	39	53	29	39	40	35	36	45
Screen to 1 st core biopsy (cancer)	56	88	67	39	43	30	36	34	32	43	40
Cancer core to 1 st surgery	99	126	95	70	75	350	58	61	69	75	76
Benign core to 1 st surgery	121	160	165	72	86	0	0	138	96	84	111
1 st core to 1st surgery (if multiple cores)	37	43	45	35	32	320	24	28	45	34	41
No core to 1 st surgery	99	115	92	30	78	0	0	69	55	0	95

Tables 10 and 11 are included for use at the **district** level to provide a baseline for each DHA and perhaps assist in reform at the district level. They include Nova Scotia Breast Screening database results only. Of importance are trends that possibly could become indicators for each district.

Age groups outside of the NSBSP target ages are included in outcome assessment tables. NSBSP considers numbers and types of assessment tests to be helpful and relevant information for both provincial and district feedback. It is particularly useful for analyzing how health service providers apply the Clinical Practice Guidelines.

These outcomes are important at the **provincial** level to assist in providing continuous quality improvements to all services in place in both screening and diagnostic sites. These are ultimately passed on to clients attending the program.

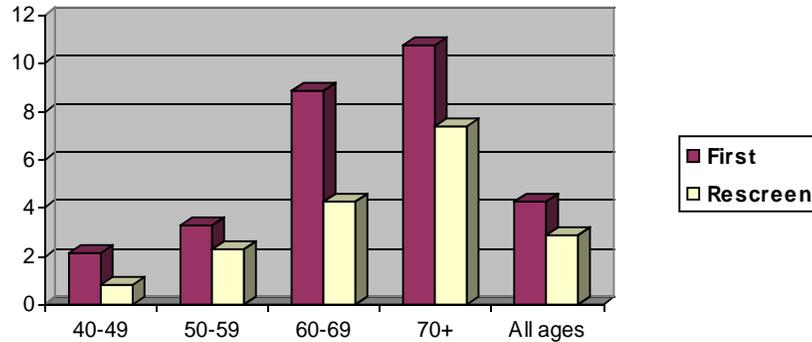
- **Invasive Cancer Detection Rate**

Number of women detected with invasive cancer during a screen episode per 1,000 women screened

Target: 1st screen > 5 per 1000 screens

Re-screen > 3 per 1000 screens

Figure 6a 2004 Invasive Cancer Detection Rates per 1,000 Screens by age



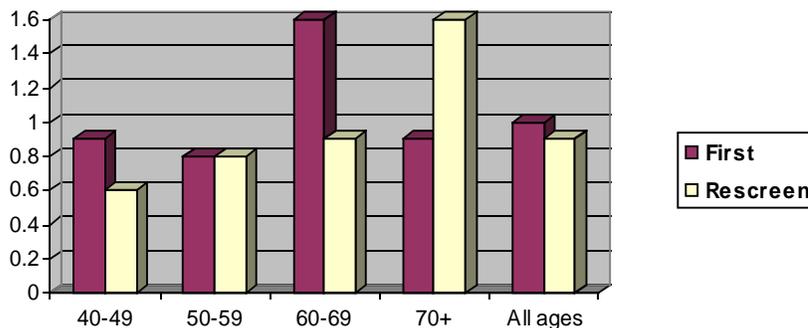
There were 157 cases of invasive breast cancer detected in 2004. Although shown in ten year age groups above, 122 (78%) of these were in the 50-69 age group for a cancer detection rate of **3.5 per 1,000 screens**. Nova Scotia is higher than national targets of more than 5 per 1,000 for first screens and more than 3 per 1,000 for re-screens at **5.3** and **3.1** respectively. It may well be that with the screening program now in place, the invasive cancer rates will continue to fall as more high risk lesions are picked up in the screened population at a pre-cancerous or early stage (DCIS and atypical). The rate of invasive breast cancers increases by age group for both initial screens and re-screens.

- **In Situ Cancer Detection Rate**

Number of women detected with ductal carcinoma in situ (DCIS) cancer, rather than invasive cancer, during a screening episode per 1,000 women screened

Target: This performance indicator is collected for surveillance and monitoring purposes only

Figure 6b In Situ Cancer Detection Rate per 1,000 Screens by age



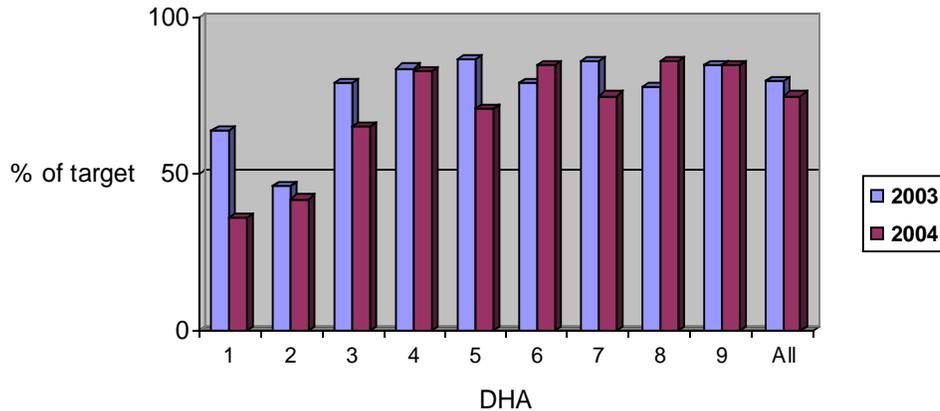
There were 43 cases of (DCIS) detected in 2004. Of these 25 (58%) were aged 50-69. The in situ cancer detection rate for this age group was **0.9 per 1,000 screens** similar to the 1% national rate. The Performance Indicator's Working Group felt it inappropriate to set targets for DCIS due to lack of evidence of the transition of DCIS to invasive cancer and increasing sensitivities of screening techniques.

- **Diagnostic Interval**

Total duration from abnormal screen to resolution of abnormal screen

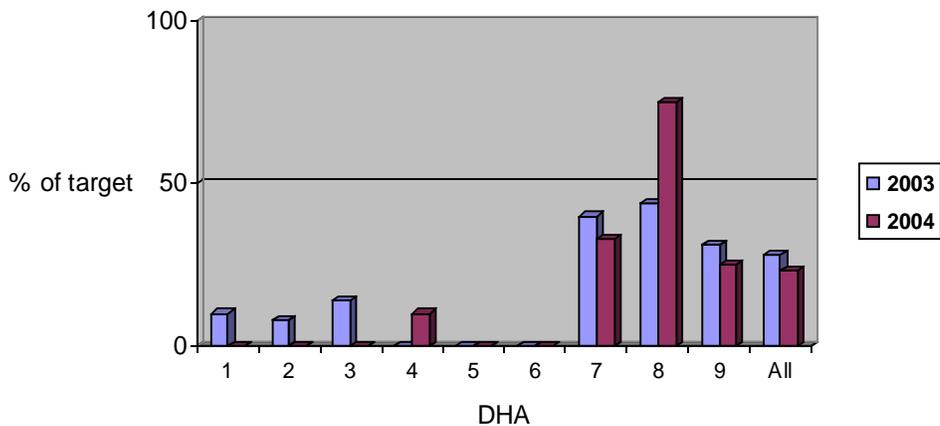
Target: (1) $\geq 90\%$ within 5 weeks if no open biopsy (2) $\geq 90\%$ within 7 weeks if open biopsy

Figure 7a Abnormal screen to diagnosis time- no biopsy



The NSBSP 75% “**Diagnostic Interval**” of women having **no** open biopsy (Figure 7a) is shorter than the last reported national average of 69% (Table 3, Page 9). In DHA 8 where complete data is available for the year and NSBSP policies are supported and enforced, shortest diagnostic intervals are seen for 2004. In all but two District Health Authorities (6 and 8) the diagnostic intervals for women having no open biopsy were longer in 2004 than the previous year.

Figure 7b Abnormal screen to diagnosis - with biopsy



In Nova Scotia in 2004 the overall **Diagnostic Interval** for women having an open biopsy (23%) was longer than the 2003 diagnostic interval of 28%. In 2003 the national average was 46% of women attaining a diagnosis within 7 weeks (Table 3, Page 9). Once again the team in DHA 8 demonstrates better results, which continue to improve compared to results from the other districts in Nova Scotia which fall considerably short of the goal set by this particular indicator.

Also of note are improved abnormal screen to diagnosis times after open biopsy in DHA 4 compared to 2003, so soon following its participation with the provincial program (Figure 7b). This is attributed

to compliance with both the Core Biopsy Program and Clinical Practice Guidelines for the Care and Treatment of Breast Cancer (CPGs) in that district. Both DHA 8 and 4 are outcome driven and use the provincial mammography booking database. DHA 7, although not an accredited mammography site and therefore not included under NSBSP, none the less implemented an active Core Biopsy Program in conjunction with DHA 8 in the mid 90s. This could attribute to the improved times to diagnosis for women proceeding to surgery in DHA 8 in comparison to DHA 1, 2, 3, 5 and 6 where these times are less desirable. Although there is an active core biopsy program in DHA 2, the official NSBSP navigation process has not been in place there, resulting in longer times to diagnosis compared to the program affiliated districts actively promoting this activity. Numbers of surgeries for which results were based, can be seen in **Table 10** (Page 18) showing surgical outcomes for screening patients only.

- **Positive Predictive Value**

Proportion of abnormal cases with completed follow-up found to have breast cancer (invasive or in situ) after diagnostic work-up

Target: 1st screens \geq 5% of abnormal screens are cancer

Re-screen \geq 6% of abnormal screens are cancer

One international publication has stated that Positive Predictive Values (PPVs) for initial mammograms were as high as 37.5% in the Netherlands where corresponding recall was 1.4%, and as low as 5% in the United States where the corresponding recall was 15.1%. Cancer detection rates did not closely follow the pattern of the recall rates. These differences may be influenced by factors including prevalence of cancer in the screening population, radiologist training, quality of the mammograms and fear of malpractice and legal outcomes. *Report from the International Breast Cancer Screening Network (IBSN), Draft paper 24 September 2003.*

Several radiologists in NSBSP maintain consistently high PPVs. Determinants of this trend seem to be dependent on the length of involvement in the program, level of commitment, interaction of the imaging team and frequency of multi-disciplinary team rounds reviews. PPVs for three NSBSP radiologists in 2004 were 21%, 15% and 14 % with corresponding abnormal reporting rates for first reads of 2.6%, 3.4%, 8.3% respectively. All three radiologists are in groups practicing guideline reporting (**Figure 4**, Page 15). Since the beginning of the program, all participating radiologists receive a letter detailing their individual PPV, abnormal rate and cancer detection rate for both first and subsequent screens.

Specialist radiologists detect more cancers, more early stage cancers, recommend more biopsies, and have lower recall rates than general radiologists. *Performance parameters for Screening and Diagnostic Mammography: Specialists and General Radiologists; Edward A Sickles MD, Dulcy E. Wolverson MD, and Katherine E Dee MD; RSNA, 2002.*

Figure 8 High-Low Positive Predictive Values Average (%) 50-69

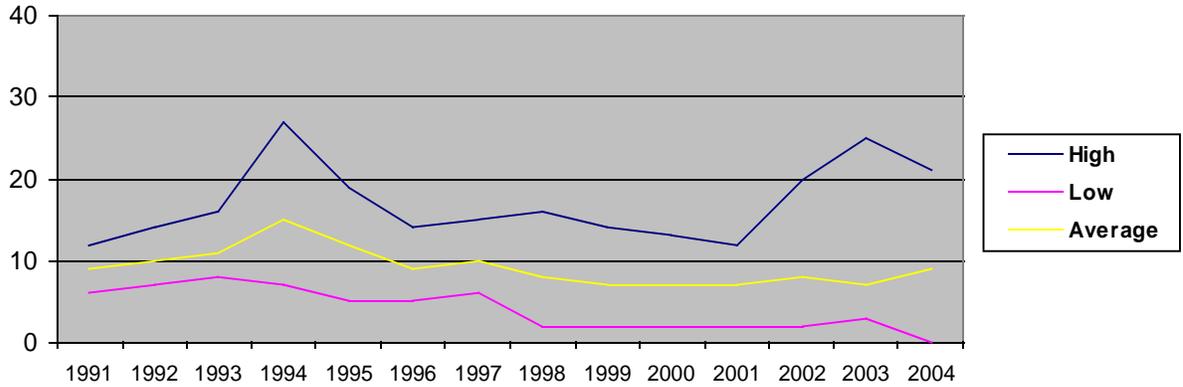


Figure 8 demonstrates for the target age group, the individual highest and lowest as well as the average PPV for the indicated years. In 2004, the lowest PPV was attributed to the radiologist reading the fewest screens. A downward trend of performance can be seen especially after 1994 and 2003 as new sites joined the program. The highest number of target age, first read mammograms interpreted in 2004 by a NSBSP radiologist was 2,951 with a corresponding PPV of 15%. The overall highest PPV since 1991 is 21%.

- Benign to Malignant Open Biopsy Ratio**

Among open biopsies, the ratio of the number of benign cases to the number of malignant cancer cases
 Target: $\leq 2 : 1$ for all open biopsies

Figure 9 2004 Benign to Malignant Surgical Ratio by District 50-69

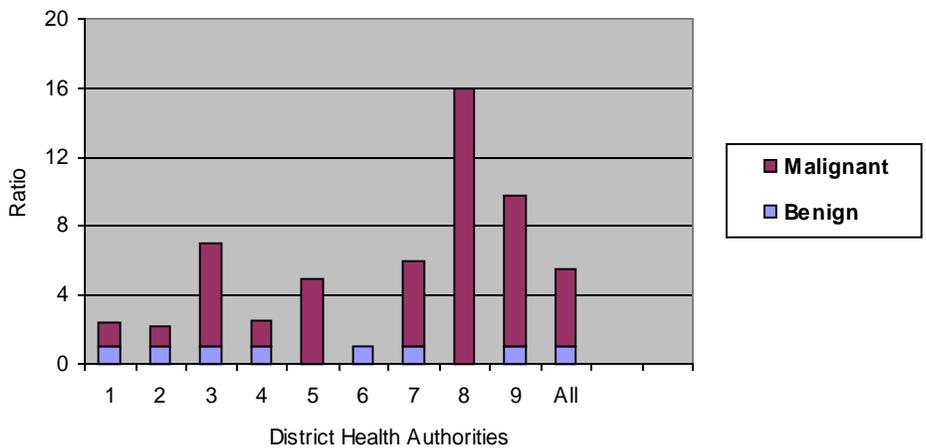
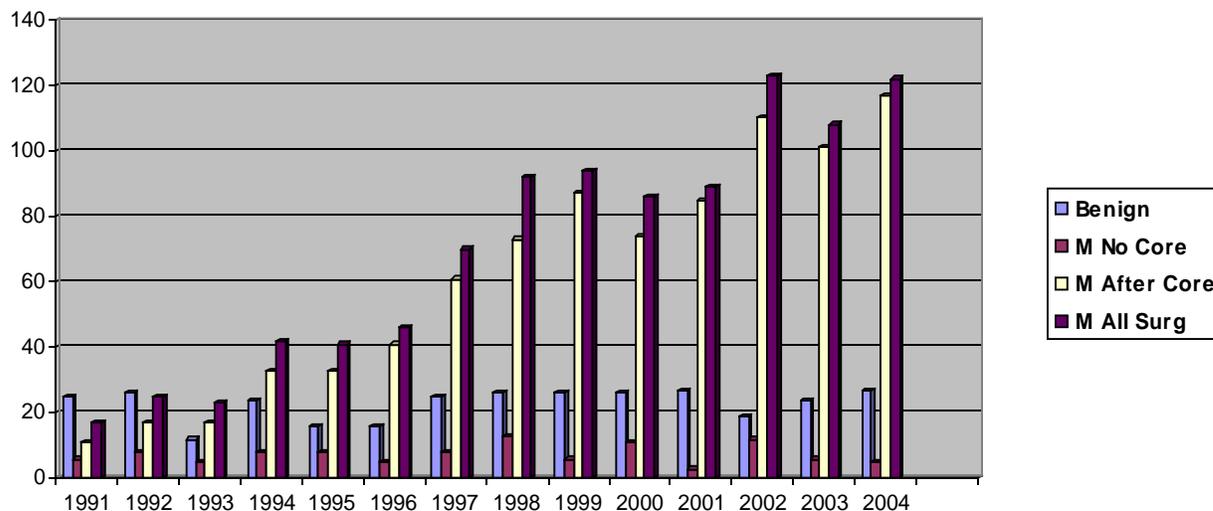


Figure 9 demonstrates the 2004 benign to malignant surgical ratios (1 : 4.5) for women in the screening database, indicating that for every one benign surgical outcome, there were 4.5 malignant outcomes. As in 2003, no benign cases were detected through NSBSP in Districts 5 and no malignant cases in district 6 due to minimal NSBSP facilities in those areas. In district 8, there were 16 cancers detected and no benign surgery on women screened through the program. Improved rates are seen in districts 8 and 9, where NSBSP policies and guidelines are followed and there has been longer participation with

the program. **Figure 9** has potential to be more significant in the future if all diagnostic facilities join with Central Mammography Booking. The important outcome is to find the greatest number of small cancers with minimum work-up, decreased waits and surgeries.

Figure 10 Malignant (M) and Benign (B) Surgical Outcomes by Year (50-69)



The relationship between the number of benign outcomes and number of malignant outcomes not having had a core biopsy as part of their work-up remains similar from the beginning of the program. It is also apparent in **Figure 10** that the number of malignant surgical outcomes has increased substantially over the years as the program has grown. It can be seen that the number of cancers subsequently detected after core biopsy, remains in proportion to total number of cancers detected from open surgical outcomes. One benign or malignant surgical outcome per woman is used in **Figure 10** indicating that benign : malignant outcome ratios of surgery have improved greatly since the start of the program.

The number of core biopsies has increased as new sites joined the organized screening program in 1994, 1997, and 2002. In 2004, there was one positive core biopsy case that did not proceed to surgery.

Table 12 2004 Biopsy Results ages 50-69

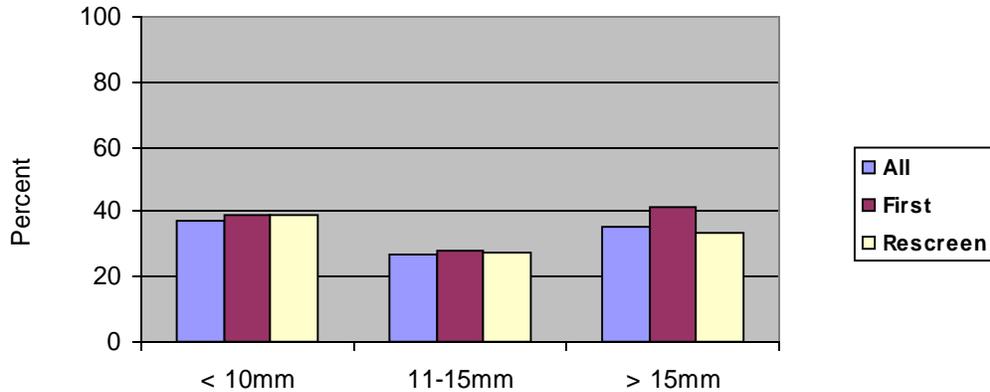
	Screens n= 27,480			
	B n=	M n=	Ratio	Rate
Benign : Malignant open biopsy ratios (all)	27	201	0.13 : 1	-
Benign : Malignant open biopsy ratios – direct to open biopsy (no core)	11	5	2.2 : 1	-
Benign : Malignant open biopsy ratios – after core biopsy	16	117	0.14 : 1	-
Benign open biopsy rate (all) per 1000 screens	27	-	-	0.98
Benign core biopsy rate per 1000 screens	298	-	-	10.8

- **Invasive Cancer Tumor Size**

Percentage of invasive cancers with tumor size of <10mm in greatest diameter as determined by the best available evidence

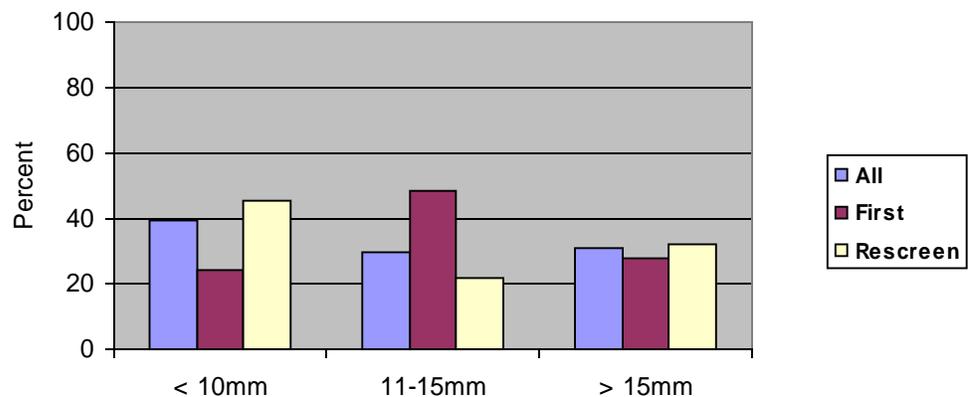
Target: > 25% ≤ 10mm

Figure 11a Invasive Cancer Tumor Size 1991-2004 (all ages)



Of 1,439 cancers detected from the start of the program, 77% (1,102) were invasive and of these, 33% were 10mm or less and 70% stage 1 or better. During this time 332 cases of DCIS and 5 cases of LCIS were also detected. In over 99% of cases, these tumor sizes were obtained from pathology reports, with film measurements utilized only if required.

Figure 11b Invasive Cancer Tumor Size 2004 (ages 50-69)

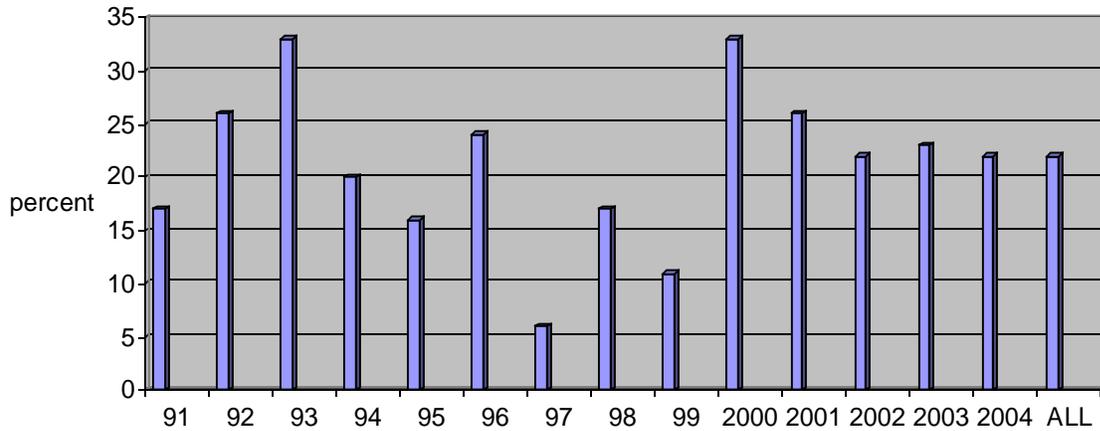


In 2004, in the target age group, 122 cancers were detected. Of these, 80% were invasive and of these, 39% were 10mm or less. Sixty-nine percent were stage 1 or better. During this time, 25 cases of DCIS were also detected and there were no cases of LCIS.

• **Node Positive Cancers**

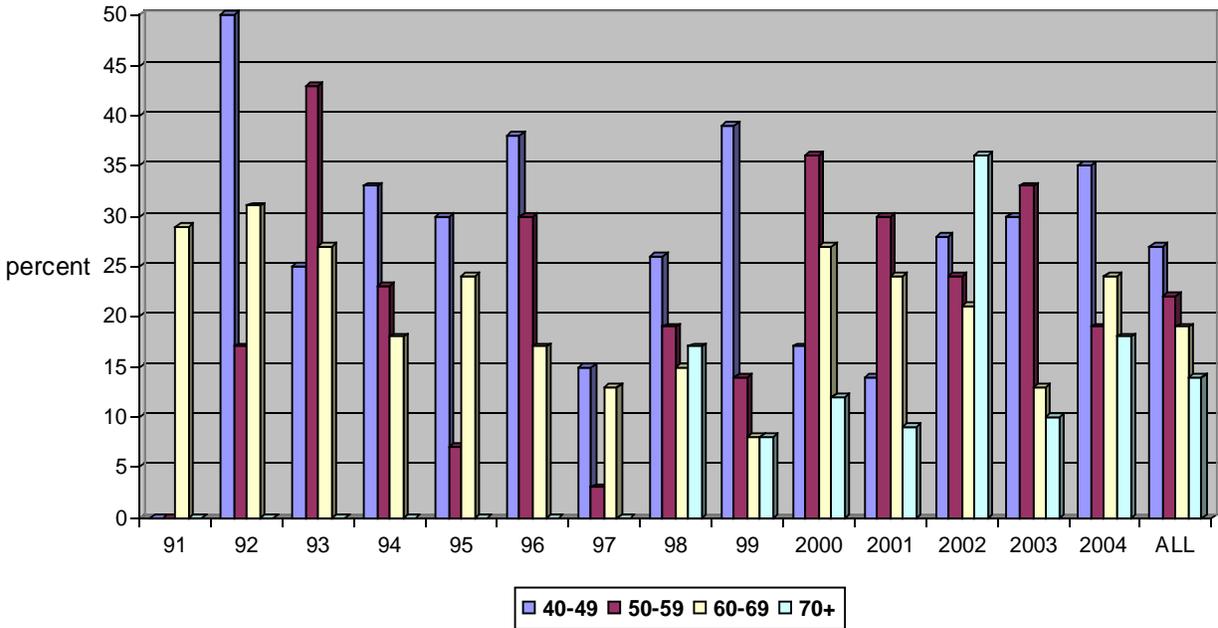
Proportion of invasive cancers in which the cancer has invaded the lymph nodes
Target: < 30% node positive

Figure 12 Node Positive Cases by Year 50-69



Since the beginning of the program 20% of all invasive cancers were node positive. In 2004, overall there were 157 invasive breast cancers in all ages, of which 35 were node positive. There were 97 invasive breast cancers in the **target age** group of which 21 (**22%**) were node positive. In all age groups there were 158 lymph node dissections and of these, 14%, 28%, 35% and 23% were in the 40-49, 50-59, 60-69 and 70+ age groups respectively.

Figure 12b Node Positive Cases by Age and Year



In **Figure 12b** (Page 25) during the first seven years, there is an absence of women over age 69, due to a policy to not accept this age group until 1998. At that time, after many complaints from older women in good health and feeling discriminated against, it was decided to accept but not recall these women over 69. In 2004, 10% of women screened were over age 69. Since 1991, **27%** of node positive cancers have been detected in ages 40-49, and **22%**, **19%** and **14%** respectively in women ages 50-59, 60-69 and over age 70.

The initial six months of the program demonstrate the similar effect of not accepting the 40-49s. However, physicians and women in their 40s lobbied strongly in an effort for them to become part of the program. Following a relatively high cancer detection rate and a high number of node positive cases seen in this group, in 1992 it was decided to change policy and accept these women in order to provide organized outcomes for this younger group for whom surveillance and monitoring should also occur. If this had not been done, they would have continued to have screening mammography in the diagnostic mode, resulting in unwanted appointments in the diagnostic sector with no tracking of outcomes. In 1995, it officially became policy to send recall letters to these younger women using the annual screen protocol.

• **Post-screen Detected Invasive Cancer Rate**

Number of women with a diagnosis of invasive breast cancer after a negative screening episode per 10,000 person-years at risk, within 12 and 24 months of the screen date

Target: Canada :	< 6 per 10,000 person years (within 12 months, age 50- 69)
	< 12 per 10,000 person years (within 24 months, age 50-69)
United Kingdom :	12 per 10,000 screens (within 24 months)
Australia :	< 6.5 per 10,000 (within 12 months)

NSBSP has identified post screen detected cancers from the start of the program, but it is known that reporting of these is of little or no use unless accurate data is available. Post screen cancers are routinely reviewed at four provincial site team rounds reviews as an ongoing quality assurance measure. Of importance is the identification of programmatic sensitivity and specificity, the latter which may not be calculated without proper identification of these cancers. In September 2002, NSBSP had identified **141 (6/10,000)** non-compliant cancers and **131 (6/10,000)** true interval cancers.

To enable relevant comparison to other program indicators and other international reports, this particular indicator will be looked at internally by NSBSP using the definitions provided by the United Kingdom and Australia. They will include cases based on screen interval recommendations.

Former Initiatives

Database Development

From a simple flat file database available in 1991, a complete rewrite upgraded the NSBSP system to a user friendly and user developed relational database completed in 1997. A second rewrite began in 2002 and when completed in June 2004 resulted in standardized data entry procedures and outcomes for both screening and diagnostic mammography from one database. Meetings with the provincial Meditech Hospital Information System administration in the past have discussed a pilot linkage project. This year provincial funding has been put in place to cover costs for one additional NSBSP system support person.

Central Mammography Booking (CMB) and Diagnostic Wait Times

A project designed to book all mammography appointments, both screening and diagnostic through one call center was completed and implemented in December 2000. Prior to this, two mobile vans utilized the booking center. Funding for computer interfaces and programming for this project was obtained through the federal government's Infostructure Support Program and the Canadian Breast Cancer Foundation - Atlantic Chapter. Initially the project enforced standard booking guidelines and booked appointments for two NSBSP vans, one NSBSP fixed site and one diagnostic center. In May 2001, June 2002, April 2004, June 2004 and July 2005 diagnostic mammography departments at the Cape Breton Regional Hospital (Sydney), Dartmouth General Hospital, Colchester Regional Hospital (Truro), Cumberland County Health Care Center (Amherst) and the South Shore Regional Hospital (Bridgewater) respectively, joined the program. Core biopsies are now also booked through NSBSP. In August 2005, the provincial diagnostic program included sites listed in **Table 13**.

Table 13 **Impact of CMB on Diagnostic Waiting Lists**

Hospital	Wait Sept 2000	Wait May 2001	Wait May 2002	Wait May 2003	Wait May 2004	Wait May 2005
QEII HSC (Hfx)	6 mos	2 mos	3 wks	1 wk	2-4 days	4 days
CBHCC (Sydney)			3 mos	2 wks	1 wk	11 days
DGH (Dartmouth)			4 mos	2 wks	1 wk	10 wks
CRHCC (Truro)			3 mos	1 wk	1 wk	3 days
YRH (Yarmouth)			4 mos	3 mos	3 mos	2 days
SSRH (Bridgewater)*					4 mos	4 mos

*Joined CMB in July 2005

There is a considerable body of evidence that an abnormal breast cancer screening precipitates acute anxiety especially upon receipt of notification of the abnormal screen. Anxiety may persist for several months after resolution of the screening episode, even after the woman has been informed that she does not have cancer. *Waiting for a Diagnosis after an Abnormal Screen in Canada: Minister of Public Works and Government Services Canada, 2000*. With a goal of enabling NSBSP to process the bookings for provincial diagnostic mammography departments and to assist in channeling the flow of asymptomatic women to the screening program, CMB has successfully decreased waiting times at the diagnostic sites.

With appropriate integration of diagnostic and screening mammography programs through one Centralized Mammography Booking system, it can be seen that wait times for diagnostic appointments can be maintained reasonably (**Table 13**). Unavoidable staffing problems have contributed to an increased wait of **10 weeks** at the Dartmouth General Hospital, however there is now additional flexibility for women to choose an earlier appointment at another facility. This is particularly useful in the Halifax/Dartmouth area where film storage for previous mammograms is located in one off-site facility.

Double Read System

Since the beginning of the program every tenth screening mammogram has been selected for a second interpretation by a different radiologist. These cases are computer selected and this process requires that these films be re-loaded following reporting sessions and applicable radiologist's schedules must be taken into consideration to avoid delays. Future reports will look at results. In addition to this formal approach, an unofficial double read system (Figure 13, Page 33) has been encouraged and may include peer review at a different hospital. Although this is work intensive for the entire team, it has decreased work-up rates and is in the best interest of the clients.

Publications

Published works of the Nova Scotia Breast Screening Program include:

- Stereotaxis Needle Core Biopsy of Breast Lesions Using a Regular Mammographic Table with an Adaptable Stereotaxic Device (AJR 1994; 163: 317-321)
- Nova Scotia Breast Screening Program Experience: Use of Needle Core Biopsy in the Diagnosis of Screening-Detected Abnormalities (Radiology 1996; 198: 125-130)
- Patient Navigation: Improving Timeliness in the Diagnosis of Breast Abnormalities (CARJ Vol 55, No. 3, June 2004)
- Ten Years of Breast Screening in the Nova Scotia Breast Screening Program, 1991-2001. Experience: Use of an Adaptable Stereotactic Device in the Diagnosis of Screening-Detected Abnormalities (CARJ vol 56, No. 2, April 2005)

Community Based Computerized Mobile Approach

A community ownership and co-ordinated approach has resulted in buy-in of the provincial program at the community level while also taking advantages of the administrative services offered by the centrally located NSBSP office. Although mobile services result in increased effort and higher cost per screen, the multi van approach has significantly served to increase accessibility and participation in this province where originally there were twelve mammography units doing opportunistic breast screening. All three mobiles are computerized with real-time computer linkage to both the corresponding Interpretation Centers and the Central Administration office. As a province where socio-economic influences often preclude attention to health programs, particularly those dealing with prevention, all three mobile units have been operating at close to maximum capacity. Extra funding for staff was approved in 2004 to enable Mobile 1 to maximize hours of operation, i.e. open evenings and Saturdays.

Fee for Service Increase and Provincial Breast Screening Quality Initiative

The Nova Scotia procedure fee for screening mammography increased following a proposal put forward to the Medical Society of Nova Scotia. In April, 2004 the fee was raised from \$7.34 to \$10.47. The previously lower reimbursement rate contributed somewhat to the slow development of NSBSP. It was felt that a new screening fee would encourage participation from imaging departments not presently part of this program's Central Booking structure. Also effective in April 2004, screening mammograms are to be performed only at screening centers accredited by the Canadian Association of Radiologists.

Self reported Canadian mammography data from 2000-2001 which includes screening mammograms occurring external to the Canadian organized programs, estimates participation rates of 64.7% with a considerable portion of this screening taking place in the higher fee for service sector. This mammography is performed in an ad hoc fashion without organized recall, monitoring and surveillance measures (*Health Canada. Organized Breast Cancer Screening Programs in Canada - 1999 and 2000 Report. Ottawa: Minister of Public Works and Government Services Canada, 2003, 13-15*).

The Core Biopsy Program

Under auspices of NSBSP a core biopsy program was started to coincide with the program start in 1991. Database development has permitted tracking these examinations. Since the beginning of the program in June 1991 until December 2004, a total of 5,134 stereotactic core biopsies and a reported 151 ultrasound guided core biopsies have been performed. Results may be seen in **Tables 9a and 9b**.

Promotion of stereotactic needle core biopsy as opposed to ultrasound guided core biopsy is preferred for the following reasons:

- in a screening population, lesions are nearly always identified by mammography, and if the core biopsy is benign they are followed by mammography. If lesions are malignant, they are localized by mammographic guidance and mammographic specimens to confirm excision
- stereotactic localization following stereotactic core biopsy, by design, also localizes the core biopsy track so that this can be removed at the time of surgery
- stereotactic films are very reproducible unlike ultrasound which is operator dependant
- many lesions identified by mammography (especially calcifications) are not seen during ultrasound guided core biopsy, even by experienced ultrasonographers
- documentation of a missed lesion by ultrasound is difficult but clearly present with the NSBSP stereotactic needle core biopsy approach *Nova Scotia Breast Screening Program Experience: Use of Needle Core Biopsy in the Diagnosis of Screening Detected Abnormalities, Radiology 1996*. For this reason, a negative ultrasound guided core biopsy is not as acceptable to many clinicians and the patient usually must go on to have surgery regardless of negative results.

Core biopsy is a superior method for the evaluation of non-palpable lesions due to increased diagnostic specificity and reduced rate of inadequate samples. *Brenner RJ, Bassett LW, Fajardo LL, Dershaw DD, Evans WP III, Hunt R, et al. Stereotactic core needle biopsy: a multi-institutional prospective trial. Radiology 2001; 218: 866-72*. In reports comparing stereotactic core biopsy to surgical biopsy, the sensitivity of core biopsy for diagnosis of malignant lesions varies from 85% to 98%. However in a multi-institutional study in which the results of 1,363 image directed core biopsies were compared with the results of subsequent surgical biopsies there was 98% agreement and only 1.1% false-negative core biopsy outcome (level III evidence). *Parker SH, Burbank F, Jackman RJ, Aucreman CJ, Cardenosa G, Cink TM, et al. Percutaneous large-core breast biopsy: a multi-institutional study. Radiology 1994; 193: 359-64*. **False negative core biopsy outcome from the Nova Scotia Breast Screening Program from 1991 to 2004 is also 1.1%**. For both stereotactic and ultrasound core biopsy to be successful, there needs to be a validation process and team management.

Cancer has a significant economic impact in Canada as measured by direct and indirect costs. Direct costs refer to the value of goods and services for which payment was made and resources used in treatment, care and rehabilitation directly related to illness or injury. Indirect costs are defined as the value of economic output lost because of illness, injury-related work disability or premature death (*National Cancer Institute of Canada: Canadian Cancer Statistics 2004*). In 1998, in Canada, \$2.5 billion were direct costs with hospital care costing \$1.8 billion and representing 74% of this amount. Physician services to treat cancer cost \$333 million, or 14% of direct costs. Approximately \$210 million or 9% of direct cancer costs were spent on drugs for cancer treatment. The indirect cost was \$11.8 billion. *Economic Burden of Illness in Canada, Health Canada 2002*.

Although the figures above represent costs for all cancers and for all Canadian provinces, the core biopsy program in Nova Scotia has made positive impacts on reducing wait times, hospital stays and physician services. It has made a huge impact in greatly decreasing benign breast surgeries.

The Pink Rose Project and Physician Assisted Navigation

The Pink Rose Project instituted the provision of “Information Packages” to newly diagnosed women at the time of imparting the diagnosis. Started and managed by a volunteer breast cancer survivor under the umbrella of NSBSP, this initiative has been adapted and introduced into most other provincial programs. Begun as a service provided by one hospital, the packages are now funded by the Canadian Breast Cancer Foundation - Atlantic Chapter, and distributed by pathology departments, NSBSP coordinators, Cancer Care navigators as well as active survivors throughout the province.

With the development of NSBSP in 1991, physician assisted referral for all abnormal **screens** to the diagnostic work-up sites was instituted. The physician was always the first point of contact by phone, and with their approval the program would (also by phone) contact the patient with the date, time, place and nature of the work-up test or core biopsy. As in all screening programs, results were also mailed to both women and physician. This fast tracking resulted in decreased times to diagnoses and overwhelming acceptance of the process. In 1997, requests from the medical community to also navigate women with abnormal reports in the **diagnostic** sector resulted in a full time navigation position. In addition, through personal contact with physicians and women, the navigator has promoted a heightened awareness of the clinical practice guidelines for mammography. This single NSBSP diagnostic-based position has been closely tied to and supported by The Pink Rose Project.

The Pink Rose Navigator is a resource for women using diagnostic and screening facilities in the entire province, whether affiliated with NSBSP or not. *Patient Navigation: Improving Timeliness in the Diagnosis of Breast Abnormalities* was published in June 2004 in the Canadian Association of Radiologists Journal (CARJ Vol.55, No. 3, June 2004). This publication documents the potential to decrease waiting times related to the facilitated investigation of breast abnormalities. Other provincial breast screening programs have also incorporated a similar approach to fast-track women to diagnosis. *Influence of direct referrals on time to diagnosis after an abnormal breast screening result. Manitoba Breast Screening Program, Winnipeg, Manitoba*

Programmatic Screening of Ages 40-49

In 1993 it was recognized that women themselves were demanding mammography at age 40 and appropriate tracking mechanisms did not exist for these examinations. Until further meta-analyses are published on the subject, NSBSP (after consultation with the Department of Health) determined these women should be able to self-refer for screening mammography. Automatic recall on an annual basis for women 40-49 was instituted in 1995.

Current evidence suggests there is good evidence to screen the 40-49 age group providing quality assurance aspects of the program are in place and outcomes can be monitored. One trial presently being conducted under the auspices of the United Kingdom Coordinating Committee for Cancer Research (UKCCCR) was planned for first analysis in 2003. Similar feasibility studies are also in progress in four other European countries. These trials recognize that if early detection of breast cancer is to be effective in younger women, the intervals between screen episodes must be shorter. Like many other provincially organized breast screening programs, NSBSP awaits outcome analysis of these studies.

The Nova Scotia Breast Screening Program Web-site

From the web site originally designed in 2002 by a high school student as a summer project, the updated site now includes current mobile van schedules as well as program guidelines. The NSBSP site may be visited at www.breastscreening.ns.ca. It is updated yearly to coincide with annual releases of the three mobile van schedules and following changes to policy.

Annual Radiologist Mailing Each year radiologists associated with the program receive feedback containing their individual cancer detection rates and positive predictive values of the previous year. In

this way the learning curve trends inherent to the interpretation of screening mammography are directly shared, and can be monitored by each screener for enhancement of results.

Post Card Reminders

To eliminate many hours of manual work, weekly reminder letters now are printed as postcards with computerized-addresses. This small change has increased time available for booking appointments and was started following a survey indicating a 98% acceptance by clients surveyed. The new provincial database including both diagnostic and screening modules will in future include a mechanism to send out reminder post cards for diagnostic procedures as well.

1 in 9 Workshop

As part of a continuing medical education collaboration, Dalhousie University in Halifax, the Canadian Cancer Society and NSBSP organized “The 1 in 9 Workshop” for medical students and residents. This was put in place in 1997 using resources from the breast screening program and Department of Family Medicine at the university. This is a four hour intensive information session focusing on breast screening processes, clinical breast examination, breast cancer and the emotional impact of breast cancer following detection. The lectures and small group workshops present a powerful overview of this disease and it has continued as an annual event, and as a most useful tool for the promotion of NSBSP.

Cartoon Information Sheet Survey and Client Version of CPGs *Following an Abnormal Screening Mammogram* (Appendix 1). In 1998, NSBSP began enclosing with the client abnormal letter and work-up appointment, a modified client version of the Clinical Practice Guideline for Mammography (CPG 2). Although modified to reflect a more client friendly hand-out, feedback resulting from the modified CPG indicated a need for a still greater degree of sensitivity. Of **100** women who were also requested to survey the new cartoon enclosure, **90%** indicated having received the cartoon sheet with their letter. Of these, **63%** indicated that receiving the cartoon sheet helped reduce their anxiety level at that time. One women indicated in the comments that “it reduced her husbands anxiety level”, although not her own. Of note was a **100%** affirmative response that these women would all return to the screening site in Halifax for mammography, and acknowledgment of the positive influence of a “one to one” personal phone call when made by the woman’s physician. Of the women surveyed, **42%** provided comments.

Survey Results:

	Yes	No	No Answer	Total surveyed
First mammogram	20	80		100
Previous recall	27	61	12	100
Did receive cartoon page	90	10		90
Did it reduce anxiety	58	31	1	90
Will continue to attend NSBSP	90	0		90

Action: The cartoon mailings would continue and comments shared with physicians, staff and management of the NSBSP. The survey resulted in redesign of the cartoon sheet and a second edit of the client version of the Guideline 2 enclosure.

The Annual Report Project

The programming of “instant” outcomes for annual report generation for all sites utilizing Centralized Mammography Booking was the result of a project funded by Health Canada and successfully completed

in 2001. These instantly available reports which may be accessed by a selection of individual or multiples of years, screening sites, age groups, health care districts and first and re-screen composites, have contributed greatly to the production of timely yearly reports produced for NSBSP. The latter are

informative and current annual reports which are widely distributed and available upon request. They are appropriately used to heighten administrative efficiencies and thus enable more relevant use of funding.

Annual Physician Information Mailing

Each year a fact sheet and list of their clients using the NSBSP service is mailed to participating general practitioners. In 2004, these were distributed to more than 500 doctors. The fact sheet (a one page summarized annual report) and the “client lists” serve to increase awareness of the program’s service and are a positive reminder tool to advise women of the value of early detection. It is anticipated that the soon to be released national “Decision Aides” for women and physicians will be included in next year’s mailing.

Canadian Breast Cancer Foundation (CBCF) Partnership

Since inception of the Atlantic Chapter of the Canadian Breast Cancer Foundation, this organization has received and favorably reviewed many proposals submitted by NSBSP. The pro-active approach by the Atlantic Chapter and its many volunteers, has played a large part in the expansion of the breast screening program, database development and other program enhancements. Listed below are grants awarded NSBSP administration. The Run for the Cure (both in Sydney and Halifax) along with the many other volunteer services sponsored by CBCF - Atlantic Chapter, diligently raise and administer funds.

Past NSBSP Funding:	1997	\$36,000	toward purchase of Mobile 2
	1997	1,500	purchase of film encoder
		15,000	mammoviewer for NSBSP-Halifax
	1998/99	40,000	breast ultrasound equipment-Halifax
	1999	30,000	computer hardware for Infostructure Project
	2000	20,000	completion of Infostructure Project
		50,000	x-ray equipment replacement Machine 1-Halifax
	2001	50,000	diagnostic database hook-up to other hospitals *
	2002	150,000	Mobile 3 purchase and operating costs
	2003	35,000	x-ray equipment replacement Machine 2-Halifax
	2004	42,000	purchase of two viewers
	2005		proposal in progress

Well Woman Approach

As 98% of all women screened will not be diagnosed with breast cancer, NSBSP has maintained a focus on “Well Woman” and “Population Health” concerns. Earliest detection coupled with vigilant measures to assure that a high quality, organized, imaging program is in place, will result in more “well women” and achievement of the NSBSP goal to lower mortality from breast cancer in women. Within one year it is now envisioned that NSBSP facilities will be “province-wide”. Providing 70% of the target population is screened and diagnosis is early, both prognosis for this disease and goal expectations are excellent.

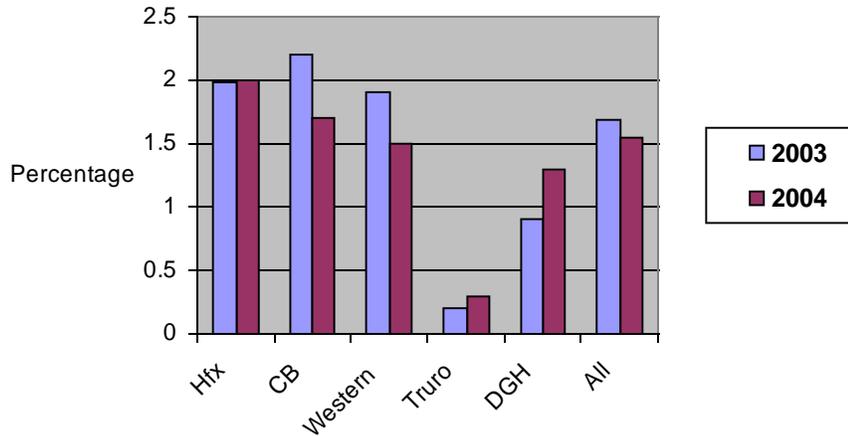
Workload Measures

Although the program philosophy for “high volume” screening is important, quality results are always the ultimate goal. Information sharing is critical for all program staff. Much has been reported about radiologist performances for the purpose of increasing cancer detection rates while keeping recalls at a reasonable level. Equally important has been to analyze booking growth for clerical and technical staff workloads over years of program expansion.

- **Radiologist:**

In 2004, the highest number of first reads was 5,283 (3,681 in 2003). There were in total, 113 cases reported as high suspicion (94 in 2003) and 757 unofficial double reads (761 in 2003).

Figure 13 Unofficial Double Reads by Interpretation Site - all ages



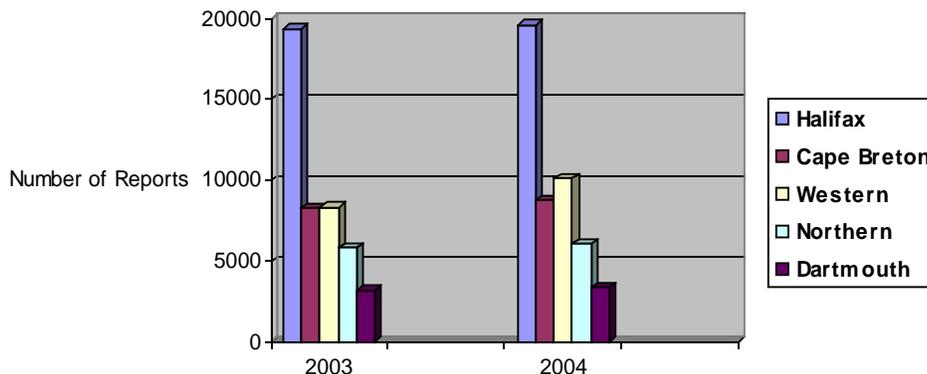
The percentage of unofficial double reads from all reporting sites is within the acceptable limit of **3 per 100** screens as defined by NSBSP. Provided this additional mechanism which is used to increase reporting effectiveness is monitored, the practice is encouraged as an additional quality assurance initiative. Of note is the fact that the actual number of unofficial double reads decreased in 2004 despite an increase in numbers of screens.

- **Technologist**

From the program inception, NSBSP technologists provided BSE teaching, a two view screening mammogram and modified clinical breast examination. In 2001, the Canadian Task Force for Preventive Health Care reviewed the evidence relating to breast self-examination (BSE). They concluded that, because there is fair evidence of no benefit and good evidence of harm, there was reasonable support to recommend that routine teaching of BSE be excluded from the periodic health examination of women ages 40-69. Consequently, NSBSP eliminated BSE as part of the breast screening examination in Nova Scotia, permitting an increase in volumes of screening mammograms.

- **Technologist and Radiologist**

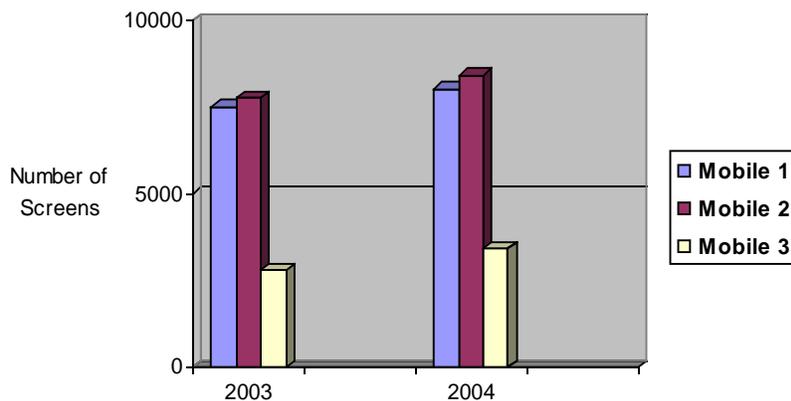
Figure 14a Volumes by Reporting Site (all ages)



Screen volume increases can be seen for all five reporting sites in 2004. Halifax, Cape Breton, Western, Northern and Dartmouth reporting sites have increased capacity by 1.6%, 5.6%, 17%, 3.4% and 7% respectively. Program commitment is particularly obvious at the Western site where NSBSP appointments have become more readily available both in the fixed site and on Mobile 2.

Technologist

Figure 14b Volume by Mobile Van (all ages)



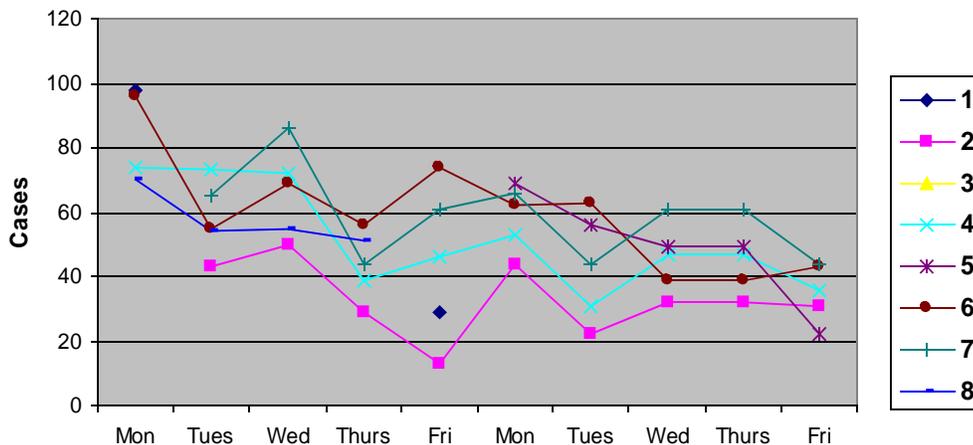
While the workload on Mobiles 1 and 2 has increased by 6.4% and 7.7%, Mobile 3 has increased production by 19%. The long-range goal of the program is to have all three mobiles performing similar numbers of examinations annually. Start-up experimentation, portability (a drive on portable mammography unit, unlike the first two self-contained mobiles) plus limited staffing of three days per week have accounted for the lower number of screens done on Mobile 3. One suggestion has been to limit the number of sites visited by Mobile 3 and develop a Program Policy to address this issue.

- **Clerical**

There were 100,562 (89,689 in 2003) procedures booked through Central Mammography Booking in 2004. Of these, 70,076 (60,452 in 2003) were program **screens**. In 2003, two full time staff members were added to the CMB complement and casual positions approved. In 2003 the diagnostic requisition workflow was delegated to 1.2 dedicated FTEs (increased to 1.5 FTEs in 2004) in an effort to maintain guidelines and standards. The maximum number of appointments booked by any one clerk in 2004 was 14,188 (17,238 in 2003), indicating effects of new staff and resulting in greater client satisfaction. 11,012 diagnostic mammograms (11,880 in 2003) and 4,025 ultrasounds (2,493 in 2003) were also booked in 2004.

Booked in addition for the **diagnostic** module were 577 Ineligible Screens (739 in 2003). An “IS” is defined at CMB as a screening exam that for some reason cannot be done through NSBSP and includes cases with special needs and requests for under age mammography screening. There were also 961 (11,189 in 2003) Physician or Patient Demanded Screens in Diagnostic (PDSs). As expected, with an increased acceptance of Centralized Mammography Booking, these two particular categories are decreasing as both women and health care givers become better educated about the difference between screening and diagnostic mammography. Follow-up mammograms, 6 month Post Core Biopsy examinations and Screen Work-Up examinations are also booked by the clerical staff at CMB.

Figure 15 Clerical Productivity Results



Currently, a review of shifts for booking clerks is underway. A restructuring of various workloads has been done to increase accuracy and maintain quality outcomes. Presently the highest number of abandoned rates for booking phone calls is between 9:00 am and 9:30 am. The 10:00 am – 6:00 pm shift is subsequently under review. Much of the work it was intended for is now obsolete and re-assignment of duties is eliminating the need for this shift. Management have recommended a focus on additional early morning phone coverage.

To assist in maintaining a high degree of client satisfaction despite continued program growth, graph-sharing (Figure 15) permits the program’s booking clerks to assess their own performance activity by accessing private biweekly results. This is routinely posted and it is clearly seen that the busiest booking days are at the beginning of each week. Although not a new concept, these bi-weekly charts greatly assist in determining appropriate staffing complements.

Current Initiatives

Geographic Mapping

Plans have recently been put in place utilizing the Center for Surveillance Coordination's Geographic Information System (GIS) to develop a fixed mobile schedule whereby the site visits will be determined on the basis of population, mammography capacity for the area and length of time to drive to the screening site. This will particularly utilize the new GIS Road Mapping tool. It is anticipated this will improve accessibility to mammography for the women of Nova Scotia with the least amount of mobile downtime due to a limitation of the number of times the mobiles must move. It will also introduce a permanent mobile schedule from year to year, enabling women to book throughout the year for a given area. With three mobile vans in the province, emphasis to standardize mobile schedules and procedures has emerged as a priority.

Redesigned Guideline Pamphlet and Cartoon Sheet

In 2003 there was an update draft from the Steering Committee on Clinical Practice Guidelines (CPGs) for the Care and Treatment of Breast Cancer. Guideline 2: Investigation of Lesions Detected by Mammography. This committee had as its objective, to provide information and recommendations to facilitate decision-making when a mammographic abnormality is detected by screening. The Medical

Imaging and Pathology team of NSBSP was instrumental in this publication. For provincial use, NSBSP management reworded the client version in 2000. In 2004, following a survey of women and physicians (Page 31) who had received this Guideline, the client version was again re-worded to further reduce women's anxiety. At the same time the cartoon sheet was slightly modified incorporating comments from both physicians and women.

Radiologist Review

Nova Scotia has been one of the provinces contributing data to the soon to be released Pan Canadian Study by a working group of the Canadian Breast Cancer Screening Initiative. This is looking at cancer detection rates and radiologist performance in relation to volumes of mammograms interpreted. The results from this study are expected in late 2005.

Organizational Procedures for Outcome Data Entry

With upgrades and changes to database systems, data entry procedures appropriate for the NSBSP database have been updated to maintain the integrity of provincial outcomes

Physical Office Re-Organization

Due to expansion in all aspects of the program over the years and with extra space becoming available in the adjoining suite housing the Halifax site of the Breast Screening Clinic, the program secretary's office was relocated at no extra cost to the program. Following approval of a casual staffing complement, additional work stations were installed for booking clerks. Physical changes were also implemented to more effectively handle the booking of diagnostic procedures.

The process to configure computerized address label printing for post card reminders was completed and eliminated much manual requirement which can now be used to increase booking efficiencies.

Viewer Purchase

Following acceptance of a proposal to the Canadian Breast Cancer Foundation for funding for mammography viewers, in 2004, three viewers were purchased by the program and located for use in imaging departments in Bridgewater, Kentville and Truro.

Policy for Clinical Breast Examination

A standardized NSBSP policy for modified Clinical Breast Examination teaching was implemented for program use in all sites. This was put in place after it became apparent that sites were applying the policy differently. The policy states that all women will receive a modified breast exam by the technologist prior to their screening mammogram. This is not a thorough examination but computer entry will be made of obvious findings for the radiologist reporting the films. BSE literature will also be available at all NSBSP sites.

The Diagnostic Reporting Database

Development of this database has been in progress for three years (Page 7) and it has been installed at the QEII Health Sciences Center in Halifax and the Cape Breton Health Care Complex in Sydney from where user feedback continues to result in enhancements. Official sign off on this project is anticipated in early 2006 at which time plans are to introduce it to other provincial diagnostic mammography providers.

Promotion

An ethnically diverse poster is being developed using funding from the DoH. This poster will picture many local residents of Nova Scotia and will include a message on the importance of breast screening. Completion date is set for early in 2006, to coincide with the 15th anniversary of NSBSP. The existing NSBSP brochure "An Important Message for You" has been translated to French and distributed to Program site Co-ordinators, the Canadian Cancer Society, physicians and health educators.

Program Cost Trends

	95/96	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05
D. S. cost per Screen	55.24	53.62	42.38	42.38	34.82	34.72	40.74	39.57	40.08
T. O. cost per Screen	86.03	72.23	58.90	58.15	51.03	51.04	54.71	55.05	54.89
D. S. cost per Cancer	12,673	10,743	8,363	9,261	8,957	9,001	9,200	9,731	9,516
T.O. cost per Cancer	19,367	14,263	11,624	12,710	13,123	13,234	12,356	13,583	13,032

D.S. = Direct Service

T.O. = Total Operating

Screening site capital expenditures and Fees for Service are not included

Administration site capital expenditures, Consultant Fees and Medical Director Fees are included

Recommendations for 2006

- Increase program capacity (Cobequid site plus increased volumes at existing sites)
- Decrease duplication by interface with Meditech
- Initiate a six month call back process for CMB diagnostic mammography sites
- Enhance clerical productivity
- Review and standardize site budget submissions