

Declining Use of Mastectomy for Invasive Breast Cancer in Canada, 1981-2000

Leslie A. Gaudette, MSc¹

Ru-Nie Gao, MD¹

Andrea Spence, MSc²

Fan Shi, MD, MSc³

Helen Johansen, PhD⁴

Ivo A. Olivotto, BSc, MD, FRCPC⁵

ABSTRACT

Objective: To evaluate the rate and magnitude of change in surgical practice for breast cancer in Canada in relation to publication dates of clinical trials and consensus conferences.

Methods: Hospital separations with a diagnosis of invasive breast cancer were extracted from the Hospital Morbidity File from 1981 to 2000. Age-standardized rates of in-patient procedures for breast-conserving surgery and mastectomy were analyzed by province and age group and by geographic region.

Results: In Canada, mastectomy rates decreased from 62.2 to 37.9 per 100,000 between 1981 and 2000; declines were largest between 1984 and 1985, following publication of the NSABP B-06 clinical trial in March 1985, and between 1991 and 1993, after the US NIH Consensus Conference in February 1991. Mastectomy rates plateaued between 1985 and 1991, and from 1993 to 2000; the transitory peak in 1988 corresponded to publicity surrounding Nancy Reagan's choice of mastectomy in 1987. Regional variations from the main pattern led to increasingly divergent mastectomy rates over time. Women aged 80+ were less likely to be treated by any surgery.

Interpretation: Publication of clinical trial results and consensus conferences were associated with changes in surgical treatment for breast cancer in Canada. However, divergent mastectomy rates among Canadian regions point to inconsistent adoption of less invasive therapy despite a publicly-funded health care system and national consensus guidelines.

La traduction du résumé se trouve à la fin de l'article.

1. Chronic Disease Management and Control Division, Centre for Chronic Disease Prevention and Control, Health Canada, Ottawa, ON
2. Division of Cancer Epidemiology, McGill University, Montreal, QC
3. Therapeutic Products Directorate, Health Canada, Ottawa
4. Health Statistics Division, Statistics Canada, Ottawa
5. BC Cancer Agency, Vancouver Island Centre and University of British Columbia, Victoria, BC

Correspondence and reprint requests: Leslie Gaudette, Manager, Treatment and Outcomes Monitoring, Centre for Chronic Disease Prevention and Control, 120 Colonnade Road AL6702A, Ottawa, ON K1A 1B4, Tel: 613-946-5159, Fax: 613-941-5497, E-mail: leslie_gaudette@hc-sc.gc.ca

Acknowledgements: The authors acknowledge the support of the Canadian Breast Cancer Initiative, and thank Dr. C. Ineke Neutel for consultation and assistance.

Surgical treatment of breast cancer in North America changed dramatically in the past two decades as breast-conserving therapy (BCS) replaced the more ablative mastectomy.¹⁻⁶ Randomized clinical trials demonstrate that women with stage I or II cancer treated either with modified radical mastectomy or BCS followed by radiation therapy have equivalent rates of survival and recurrence.⁷⁻⁹ A systematic review of publications with 10-20 years follow-up confirms these results.¹⁰⁻¹⁹ Despite this scientific evidence, the adoption of BCS varies by geographic region in both the US and Canada.^{1,20-22} In the US, BCS increased steadily in the early 1980s, reached a plateau in 1985, and increased again in the early 1990s.^{1-3,5,23} Canadian studies examining BCS utilization were limited by time period or geographic area.^{6,24-26} This study is the first in Canada to examine long-term population-based trends in mastectomy and BCS by geography and age. Observed changes are discussed in relation to clinical trial results, consensus statements, participation in clinical research, patient and surgeon preferences.

METHODS

Data sources

The Hospital Morbidity File (HMF) contains all in-patient separations occurring in Canada. The data are organized by fiscal years which will be referred to here as single years, e.g., 1981 instead of 1981/82. Separations were included if all three of the following criteria were present: the years 1981-2000; a diagnosis of invasive female breast cancer (ICD-9 code = 174) among the first five diagnoses; breast surgery codes for either mastectomy (CCP codes = 97.12-97.19) or BCS (CCP codes = 97.11, 97.27, 97.28) among the first four procedures. If both BCS and mastectomy were recorded for the same visit, mastectomy took precedence. Other variables used for this study were age, sex, and province of residence. More information on the HMF is found elsewhere.^{27,28}

Data validation

Completeness of data was assessed by comparing hospital separations for any breast cancer surgery to newly diagnosed cases of invasive breast cancer in the Canadian Cancer Registry for 4-year time periods from 1981-1984 through 1997-2000.²⁹ During 1981-1992, the difference between

total breast cancer surgeries performed and total invasive cancers diagnosed averaged 7.8%. After 1992, this difference increased due to increasing numbers of BCS performed as day surgery. To estimate the percentage of BCS performed as day surgery, we subtracted the actual percentage in-patient surgeries from the estimated total surgical rate of 92.2% (equal to the average total rate from 1985-1992).

The HMF has one record per hospital visit, and some patients may have multiple visits for breast cancer surgery. To assess the proportion of patients with multiple visits, another hospital dataset (available only since 1994) permitted us to select records of women with mastectomy or BCS between July to December, 1995 and to link these records to additional hospital visits by the same person within 3-9 months. The proportion of women receiving both BCS and mastectomy within this time period was less than 5%.

Statistical analysis

Age-standardized separation rates (ASSR) were standardized to the 1991 Canadian population and calculated per 100,000 population. Trends were examined in four-year time periods by province and age group, and per fiscal year by region. Because the numbers used in this analysis were generally very large, e.g., in excess of 250,000 over the time of the study, the CI are very small. An exception were small numbers for some provinces, such as Prince Edward Island, and thus the annual data were presented by region.

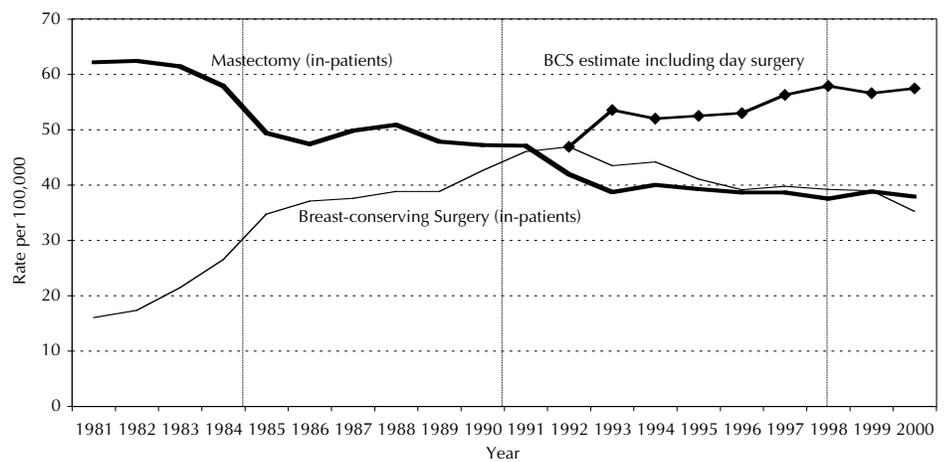


Figure 1. Age-standardized separation rates of surgical procedures for invasive breast cancer, Canada, 1981-2000

Notes: The average percent of all newly diagnosed female breast cancer that received surgical treatment during 1985-92 from hospital morbidity data was used to estimate the rates for BCS after 1992. Rates were standardized to the 1991 Canadian population. Source: Hospital Morbidity Database, for fiscal years 1981/82 to 1999/2000

RESULTS

ASSR for mastectomy declined from 62.2 to 37.9 per 100,000 in four distinct phases (Figure 1): 1) a decrease from 1981 to 1985 with the largest drop between 1984 and 1985; 2) a plateau from 1986 to 1991 with a small peak in 1988; 3) a drop between 1991 and 1993; and 4) another plateau from 1995 to 2000. ASSR for BCS mirrored those for mastectomy, rising rapidly until 1986, then almost levels until 1988, increasing again from 1989 to 1992; the combined in-patient and estimated day surgery ASSR for BCS increased slowly from 1993 onwards.

ASSR for mastectomy and BCS varied by province (Table I). The lowest provincial mastectomy rates and the highest BCS rates occurred in Quebec in all time periods. Prince Edward Island and Newfoundland and Labrador showed an opposite pattern, while intermediate surgical practice patterns occurred in the western provinces and Ontario.

Trends in mastectomy ASSR by region diverged over time so that by the late 1990s, ASSR showed greater disparity than in the early 1980s (Figure 2). Mastectomy rates in Quebec declined the most rapidly of all until 1991, and then leveled off. Elsewhere, mastectomy rates also declined sharply until 1985, but then plateaued

TABLE I

Age-standardized* In-patient Hospital Separation Rates per 100,000 for Breast Cancer Surgery by Canada and Provinces, 1981-84 to 1997-2000

Province	Mastectomy					Breast-conserving Surgery				
	1981-84	1985-88	1989-92	1993-96	1997-2000	1981-84	1985-88	1989-92	1993-96†	1997-2000†
	Rate per 100,000									
Canada	61.0	49.4	46.0	38.9	38.2	20.4	37.1	43.6	41.7	38.2
BC	69.1	59.7	58.6	47.0	44.6	12.9	29.1	32.6	38.2	40.1
AB	55.7	50.5	50.4	41.7	46.1	14.8	26.5	35.1	34.1	38.6
SK	70.1	55.7	58.0	48.9	59.1	10.3	29.1	44.7	37.2	31.9
MB	78.4	65.1	66.9	55.7	48.7	5.5	12.1	17.6	21.9	29.7
ON	61.9	49.6	46.1	37.3	35.1	24.8	44.3	49.3	44.1	34.8
QC	52.5	37.9	28.9	24.8	24.9	26.1	44.4	52.4	49.9	47.3
NB	65.4	58.8	64.3	63.2	53.4	8.3	15.0	24.7	31.6	36.3
NS	71.2	55.6	54.6	63.2	67.3	14.6	28.3	35.1	33.2	27.9
PE	38.5	71.4	71.2	69.3	75.4	22.2	19.7	27.7	24.5	30.0
NL	55.0	56.0	65.0	65.9	66.7	6.2	10.8	16.4	15.7	20.4

* Rates are age-standardized to the 1991 Canadian population.

† Rates for breast-conserving surgery for 1993-96 and 1997-2000 are underestimates in most provinces as day surgeries are not included

Total surgery rates generally compare well with the proportion of newly diagnosed cancers, especially in earlier years, but may vary according to the amount of BCS performed as day surgery.

Source: Hospital Morbidity Database, fiscal years 1981/82 to 2000/01

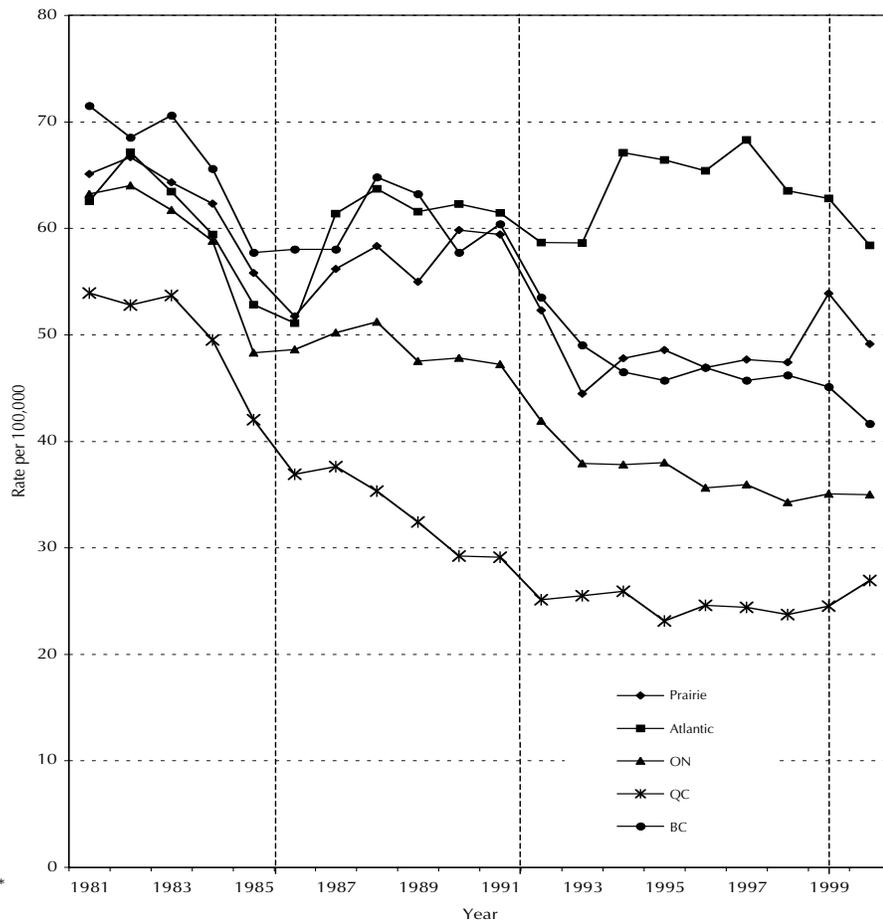


Figure 2. Age-standardized in-patient hospital separation rates for mastectomy for invasive breast cancer by region, Canada, 1981-2000
 Notes: Rates are age-standardized to the 1991 Canadian population. The vertical lines designate March 1985, February 1991, and October 1998, and refer to the respective publication dates for the NSABP B-06 trial results, the NIH consensus recommendations, and Canadian clinical practice guidelines for the care and treatment of breast cancer.
 Source: Hospital Morbidity File, for fiscal years 1981/82 to 2000/01

between 1985 and 1991 with a transient peak occurring in 1988. Unlike other regions, in Atlantic Canada mastectomy rates increased from 1994 until 1997, and then dropped to 1990 levels by 2000.

Figure 3 shows the ratio of hospital separations with mastectomy to new cancer cases, showing a decline in proportion of mastectomies in all age groups, with the greatest changes occurring in 1985-1988. For women aged 80 years and older, the decrease in mastectomy rates was less pronounced, mostly because they started lower in 1980.

DISCUSSION

Influence of publicity around significant events

In Canada, as well as in the US, a large decline in mastectomy rates occurred just after the March 1985 publication of the National Surgical Adjuvant Breast and Bowel Project (NSABP) Protocol B-06.^{1,2,4,6,9} Prior to 1985, Canada (Figure 2) and elsewhere, e.g., The Netherlands,³⁰ already experienced declining mastectomy and increasing BCS, which may have been associated with factors such as the publication of an Italian trial in 1981,⁷ discussion of the B-06 study at scientific meetings before formal publication, or a gradual acceptance of BCS while clinical trials were ongoing.

Between 1985 and 1991, all regions except Quebec show relatively stable mastectomy ASSR, including a transient peak in 1988. US studies also found this peak and associated it with publicity surrounding Nancy Reagan's choice of a modified radical mastectomy in 1987.^{3,4} The absence of this peak in Quebec may indicate a difference in dissemination of this event through the francophone media or in its perceived relevance to Quebec women.

A second large decline in mastectomy rates that occurred in all regions, except the Atlantic region (Figure 2), and also in the US followed the 1991 publication of the National Institute of Health (NIH) Consensus Conference recommendations.^{1,4} This conference supported breast-conservation therapy as the preferred treatment for stage I and II breast cancers, as it was considered to confer equivalent survival while conserving the breast.³¹ In February 1998, a steering committee convened by Health Canada published national, evidence-based clinical practice guidelines for the treatment of early

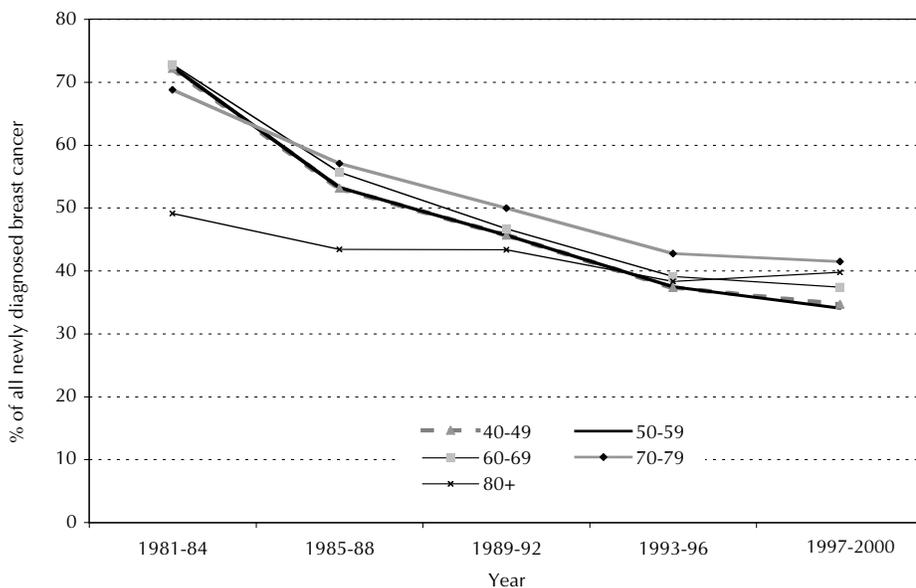


Figure 3. Mastectomy as a rate per 100 of all newly diagnosed breast cancer by age group in Canada, 1981-2000
 Source: Hospital Morbidity File and Canadian Cancer Registry

stage breast cancer for Canadian women. The recommendations regarding choice of lumpectomy or mastectomy were similar to the NIH recommendations.^{19,32} The slight declines in mastectomy rates in the Atlantic provinces from 1998 and in British Columbia from 2000 may partially reflect the impact of these guidelines.

Despite these well-publicized events, women with early stage breast cancer did not have equal chances of receiving BCS by geographic area in Canada. The pattern of increasingly divergent trends in mastectomy rates across Canada (Figure 2) suggests that treatment decisions may be influenced by factors other than publicity.

Surgeon and patient knowledge and preferences

While 75% of women diagnosed with early stage breast cancer may meet the diagnostic criteria for BCS,^{19,33,34} many factors may influence whether BCS is actually performed.³⁵ General surgeons who were not convinced that BCS and modified radical mastectomies had equivalent survival rates had higher mastectomy rates.³⁴ In Quebec and Ontario, mastectomy rates may have dropped sooner and remained lower because surgeons may have been more knowledgeable about BCS after participation in the NSABP B-06 trial. Hospitals in Ontario and Quebec that participated in multi-centre clinical trials had higher rates of BCS.^{22,26} In Quebec, without a provincial cancer control program establishing cancer care guidelines, surgeons may have had a greater influence on breast cancer treatment patterns. That the very low mastectomy rate in Quebec did not decline further after 1991 indicates that a lower limit may have been reached.

Women's knowledge and preferences also determine treatment. Quebec women may have placed greater priority on breast conservation. Among Ontario women with early stage breast cancer who were informed of the benefits and limitations of treatment options using a formal clinician-administered decision-aid, the rate of BCS decreased from 88% to 73%.³⁶ Another study found that fear of cancer was the most influential factor that led women to have a mammogram,³³ and such fear may lead women to opt for more radical surgery in spite of the equal effectiveness of BCS.

Patient and tumour characteristics

Choice of BCS is influenced by many factors, e.g., stage at diagnosis,^{1,2,5,21,37,38} tumour location,³⁸ proximity to radiotherapy facilities,^{2,38} level of education,^{2,5,35} income,² race/ethnicity,^{1,2,5,39} and age.^{1,2,5,19,38,40,41} Regarding stage at diagnosis, mammography screening in Canada resulted in detection of smaller, earlier-staged breast tumours, more amenable to BCS. However, differences in mammography screening participation across Canada are unlikely to result in sufficiently large differences in the stage distribution of tumours to account for the nearly three-fold differences in provincial mastectomy rates.⁴²

Treatment may also be influenced by age. Women aged 80 years and older were considerably less likely to receive mastectomies in Canada (Figure 3) and elsewhere.^{41,43-45} Rather than a higher rate of BCS, elderly women were the most likely to receive no surgical treatment.⁴⁶ This may be because elderly women are assumed to be too frail to withstand surgery, to have a more indolent tumour growth controllable by tamoxifen, or to have a greater likelihood of death from competing causes.⁴² These assumptions may not be true. One Canadian study found that older women who received less complete local therapy had a lower breast cancer-specific survival rates than women treated with standard local therapy.⁴³

Organization of care

National clinical guidelines recommend radiotherapy after BCS.⁴⁷ As a result, access to radiotherapy services may well influence choice of surgery.⁴⁵ Women may prefer a mastectomy over longer treatment times, longer waiting times or any increased travel required for radiotherapy. One worries that BCS may be performed in some provinces without the radiotherapy necessary to achieve equivalent survival to mastectomy.^{21,38,48,49} Women with node-negative breast cancer in 1991 in Ontario were more likely to undergo BCS than in British Columbia, but BC women treated with BCS were more likely to receive post-operative radiation therapy as recommended.²¹ Surgeons living at a distance from a radiotherapy centre may be less likely to refer patients and thus recommend mastectomy.⁵⁰ Access to radiotherapy difficulties may have contributed to the small increase in mastectomy in the Prairies and Quebec in the last few years of this study.

CONCLUSION

This study is the first to examine long-term population-based trends in surgical treatment of breast cancer in Canada and each province. The publication of key clinical trials in 1981 and 1985, the publication of the 1991 NIH consensus statement, and Nancy Reagan's 1987 choice of mastectomy were associated with changes in trends for surgical therapy for invasive breast cancer in Canada. The results also demonstrate that implementation of BCS has occurred unevenly across Canada, despite the existence of a national health care system and consensus guidelines in our country. Some of these diverging patterns may relate to surgeon or patient preference, or to variations in access or referral to radiotherapy. As population-based data are not available on the use of post-operative radiation therapy across Canada, the completeness of local therapy for breast cancer could not be assessed. To determine the extent to which this inequality of care may also be occurring with other treatment advances, a greater effort to monitor treatment patterns across Canada and provide feedback to clinicians and the public is needed.

REFERENCES

1. Lazovich D, Solomon CC, Thomas DB, Moe RE, White E. Breast conservation therapy in the United States following the 1990 National Institutes of Health Consensus Development Conference on the treatment of patients with early stage invasive breast carcinoma. *Cancer* 1999;86(4):628-37.
2. Lazovich DA, White E, Thomas DB, Moe RE. Underutilization of breast-conserving surgery and radiation therapy among women with stage I or II breast cancer. *JAMA* 1991;266(24):3433-38.
3. Nattinger AB, Hoffmann RG, Howell-Pelz A, Goodwin JS. Effect of Nancy Reagan's mastectomy on choice of surgery for breast cancer by US women. *JAMA* 1998;279(10):762-66.
4. Du X, Freeman DH, Syblik DA. What drove changes in the use of breast conserving surgery since the early 1980s? The role of the clinical trial, celebrity action and an NIH consensus statement. *Breast Cancer Res Treat* 2000;62(1):71-79.
5. Morris CR, Cohen R, Schlag R, Wright WE. Increasing trends in the use of breast-conserving surgery in California. *Am J Public Health* 2000;90(2):281-84.
6. Iscoe NA, Naylor CD, Williams JI, et al. Temporal trends in breast cancer surgery in Ontario: Can one randomized trial make a difference? *CMAJ* 1994;150(7):1109-15.
7. Veronesi U, Saccozzi R, Del Vecchio M, et al. Comparing radical mastectomy with quadrantectomy, axillary dissection, and radiotherapy in patients with small cancers of the breast. *N Engl J Med* 1981;305(1):6-11.
8. Sarrazin D, Le M, Rouesse J, et al. Conservative treatment versus mastectomy in breast cancer tumors with macroscopic diameter of 20 millimeters or less. The experience of the Institut Gustave-Roussy. *Cancer* 1984;53(5):1209-13.

9. Fisher B, Bauer M, Margolese R, et al. Five-year results of a randomized clinical trial comparing total mastectomy and segmental mastectomy with or without radiation in the treatment of breast cancer. *N Engl J Med* 1985;312(11):665-73.
10. Veronesi U, Banfi A, Salvadori B, et al. Breast conservation is the treatment of choice in small breast cancer: Long-term results of a randomized trial. *Eur J Cancer* 1990;26(6):668-70.
11. Blichert-Toft M, Rose C, Andersen JA, et al. Danish randomized trial comparing breast conservation therapy with mastectomy: Six years of life-table analysis. Danish Breast Cancer Cooperative Group. *J Natl Cancer Inst Monogr* 1992;11:19-25.
12. Van Dongen JA, Bartelink H, Fentiman IS, et al. Randomized clinical trial to assess the value of breast-conserving therapy in stage I and II breast cancer, EORTC 10801 trial. *J Natl Cancer Inst Monogr* 1992;11:15-18.
13. Jacobson JA, Danforth DN, Cowan KH, et al. Ten-year results of a comparison of conservation with mastectomy in the treatment of stage I and II breast cancer. *N Engl J Med* 1995;332(14):907-11.
14. Fisher B, Anderson S, Redmond CK, Wolmark N, Wickerham DL, Cronin WM. Reanalysis and results after 12 years of follow-up in a randomized clinical trial comparing total mastectomy with lumpectomy with or without irradiation in the treatment of breast cancer. *N Engl J Med* 1995;333(22):1456-61.
15. Arriagada R, Le MG, Rochard F, Contesso G. Conservative treatment versus mastectomy in early breast cancer: Patterns of failure with 15 years of follow-up data. Institut Gustave-Roussy Breast Cancer Group. *J Clin Oncol* 1996;14(5):1558-64.
16. Van Dongen JA, Voogd AC, Fentiman IS, et al. Long-term results of a randomized trial comparing breast-conserving therapy with mastectomy: European Organization for Research and Treatment of Cancer 10801 trial. *J Natl Cancer Inst* 2000;92(14):1143-50.
17. Veronesi U, Cascinelli N, Mariani L, et al. Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. *N Engl J Med* 2002;347(16):1227-32.
18. Fisher B, Anderson S, Bryant J, et al. Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. *N Engl J Med* 2002;347(16):1233-41.
19. Scarth H, Cantin J, Levine M. Clinical practice guidelines for the care and treatment of breast cancer: Mastectomy or lumpectomy? The choice of operation for clinical stages I and II breast cancer (summary of the 2002 update). *CMAJ* 2002;167(2):154-55.
20. Farrow DC, Hunt WC, Samet JM. Geographic variation in the treatment of localized breast cancer. *N Engl J Med* 1992;326(17):1097-101.
21. Goel V, Olivotto I, Hislop TG, Sawka C, Coldman A, Holowaty EJ. Patterns of initial management of node-negative breast cancer in two Canadian provinces. *CMAJ* 1997;156(1):25-35.
22. Iscoe NA, Goel V, Wu K, Fehringer G, Holowaty EJ, Naylor CD. Variation in breast cancer surgery in Ontario. *CMAJ* 1994;150(3):345-52.
23. Nattlinger AB, Gottlieb MS, Hoffman RG, Walker AP, Goodwin JS. Minimal increase in use of breast-conserving surgery from 1986 to 1990. *Med Care* 1996;34(5):479-89.
24. Gentleman JF, Parsons GF, Walsh MN, Vayda E. High and low surgical procedure rates in Census Divisions across Canada. *Health Reports* 1994;6(4):403-40.
25. Mayo NE, Scott SC, Ningyan S, Hanley J, Goldberg MS, MacDonald N. Waiting time for breast cancer surgery in Quebec. *CMAJ* 2001;164(8):1133-38.
26. Hebert-Croteau N, Brisson J, Latreille J, Blanchette C, Deschenes L. Variations in the treatment of early-stage breast cancer in Quebec between 1988 and 1994. *CMAJ* 1999;161(8):951-55.
27. Gibbons L, Waters C. Prostate cancer - testing, incidence, surgery and mortality. *Health Reports* 2003;14:9-20.
28. Millar WJ. Hysterectomy, 1981/82 to 1996/97. *Health Reports* 2000;12:9-22.
29. Gaudette LA, Lee J. Cancer Incidence in Canada, 1969-1993. Statistics Canada cat. no. 82-566-XPB. Ottawa, ON: Minister of Industry, 1997.
30. de Koning HJ, van Dongen JA, van der Maas PJ. Changes in use of breast-conserving therapy in years 1978-2000. *Br J Cancer* 1994;70(6):1165-70.
31. NIH consensus conference. Treatment of early-stage breast cancer. *JAMA* 1991;265(3):391-95.
32. Clinical practice guidelines for the care and treatment of breast cancer. A Canadian consensus document. The Steering Committee on Clinical Practice Guidelines for the Care and Treatment of Breast Cancer. *CMAJ* 1998;158(3)(Suppl).
33. Nold RJ, Beamer RL, Helmer SD, McBoyle MF. Factors influencing a woman's choice to undergo breast-conserving surgery versus modified radical mastectomy. *Am J Surg* 2000;180(6):413-18.
34. Tarbox BB, Rockwood JK, Abernathy CM. Are modified radical mastectomies done for T1 breast cancers because of surgeon's advice or patient's choice? *Am J Surg* 1992;164(5):417-20.
35. Potosky AL, Merrill RM, Riley GF, et al. Breast cancer survival and treatment in health maintenance organization and fee-for-service settings. *J Natl Cancer Inst* 1997;89(22):1683-91.
36. Whelan T, Levine M, Gafni A, et al. Mastectomy or lumpectomy? Helping women make informed choices. *J Clin Oncol* 1999;17(6):1727-35.
37. Ballard-Barbash R, Potosky AL, Harlan LC, Nayfield SG, Kessler LG. Factors associated with surgical and radiation therapy for early stage breast cancer in older women. *J Natl Cancer Inst* 1996;88(11):716-26.
38. Hislop TG, Olivotto IA, Coldman AJ, et al. Variations in breast conservation surgery for women with axillary lymph node negative breast cancer in British Columbia. *Can J Public Health* 1996;87(6):390-94.
39. Nattlinger AB, Gottlieb MS, Veum J, Yahnke D, Goodwin JS. Geographic variation in the use of breast-conserving treatment for breast cancer. *N Engl J Med* 1992;326(17):1102-7.
40. Samet JM, Hunt WC, Farrow DC. Determinants of receiving breast-conserving surgery. The Surveillance, Epidemiology, and End Results Program, 1983-1986. *Cancer* 1994;73(9):2344-51.
41. Hebert-Croteau N, Brisson J, Latreille J, Blanchette C, Deschenes L. Compliance with consensus recommendations for the treatment of early stage breast carcinoma in elderly women. *Cancer* 1999;85(5):1104-13.
42. Health Canada. Organized breast cancer screening programs in Canada: 1997 and 1998 report. Minister of Public Works and Government Services Canada, 2001. Cat.No.HI-9/13-1998.
43. Truong PT, Bernstein V, Wai E, Chua B, Speers C, Olivotto IA. Age-related variations in the use of axillary dissection: A survival analysis of 8038 women with T1-ST2 breast cancer. *Int J Radiat Oncol Biol Phys* 2002;54(3):794-803.
44. Turner NJ, Haward RA, Mulley GP, Selby PJ. Cancer in old age—is it inadequately investigated and treated? *BMJ* 1999;319(7205):309-12.
45. Hughes M. Summary of results from breast cancer disease study. Chapter 4. In. *A Disease-based Comparison of Health Systems*. Paris: Organization of Economic Cooperation and Development. 2003;77-94.
46. Neutel CI, Gao R-N, Gaudette LA, Johansen HL. Decreasing length of hospital stay for female breast cancer patients in Canada, 1981-2000. *Health Reports* (in press).
47. Whelan T, Olivotto I, Levine M. Clinical practice guideline for the care and treatment of breast cancer: Breast radiotherapy after breast-conserving surgery (summary of 2003 update). *CMAJ* 2003;168(4):437-39.
48. Nattlinger AB, Hoffmann RG, Kneusel RT, Schapira MM. Relation between appropriateness of primary therapy for early-stage breast carcinoma and increased use of breast-conserving surgery. *Lancet* 2000;356(9236):1148-53.
49. Olivotto A, Coldman AJ, Hislop TG, et al. Compliance with practice guidelines for node-negative breast cancer. *J Clin Oncol* 1997;15(1):216-22.
50. Paszat LF, Mackillop WJ, Groome PA, Zhang-Salomons J, Schulze K, Holowaty E. Radiotherapy for breast cancer in Ontario: Rate variation associated with region, age and income. *Clin Invest Med* 1998;21(3):125-34.

Received: July 3, 2003
Accepted: April 16, 2004

RÉSUMÉ

Objectif : Évaluer le taux et l'ampleur du changement que connaît la pratique chirurgicale relativement au traitement du cancer du sein au Canada par rapport aux dates de publication des essais cliniques et de celles des conférences de concertation.

Méthodes : Les diagnostics-congés liés à un diagnostic de cancer du sein envahissant ont été extraits de la base de données sur la morbidité hospitalière de 1981 à 2000. Les taux standardisés selon l'âge relatifs aux procédures d'hospitalisation pour la chirurgie mammaire conservatrice et la mastectomie ont été analysés par province, par groupe d'âge et par région géographique.

Résultats : Au Canada, les taux de mastectomie ont diminué, passant de 62,2 à 37,9 pour 100 000 de 1981 à 2000; les baisses ont été les plus importantes entre 1984 et 1985, à la suite de la publication de l'essai clinique NSABP B-06 en mars 1985 et, de 1991 à 1993, à la suite de la conférence de concertation des National Institutes of Health (NIH) des États-Unis en février 1991. Les taux de mastectomie ont atteint des plateaux de 1985 à 1991 et de 1993 à 2000; le point culminant de la transition en 1988 a coïncidé avec la publicité entourant le choix de Mme Nancy Reagan de subir une mastectomie en 1987. Des variations régionales par rapport à la tendance principale ont mené à des taux de mastectomie de plus en plus divergents au fil du temps. Les femmes de plus de 80 ans étaient moins susceptibles de subir un traitement chirurgical.

Interprétation : La publication des résultats relatifs aux essais cliniques et aux conférences de concertation a été rattachée à des changements dans le traitement chirurgical relatif au cancer du sein au Canada. Cependant, des taux de mastectomie divergents selon les régions canadiennes indiquent que l'adoption d'une thérapie moins envahissante fluctue, et ce, malgré un système de santé public et des lignes directrices nationales de consensus.