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Vol. 16 No. 1

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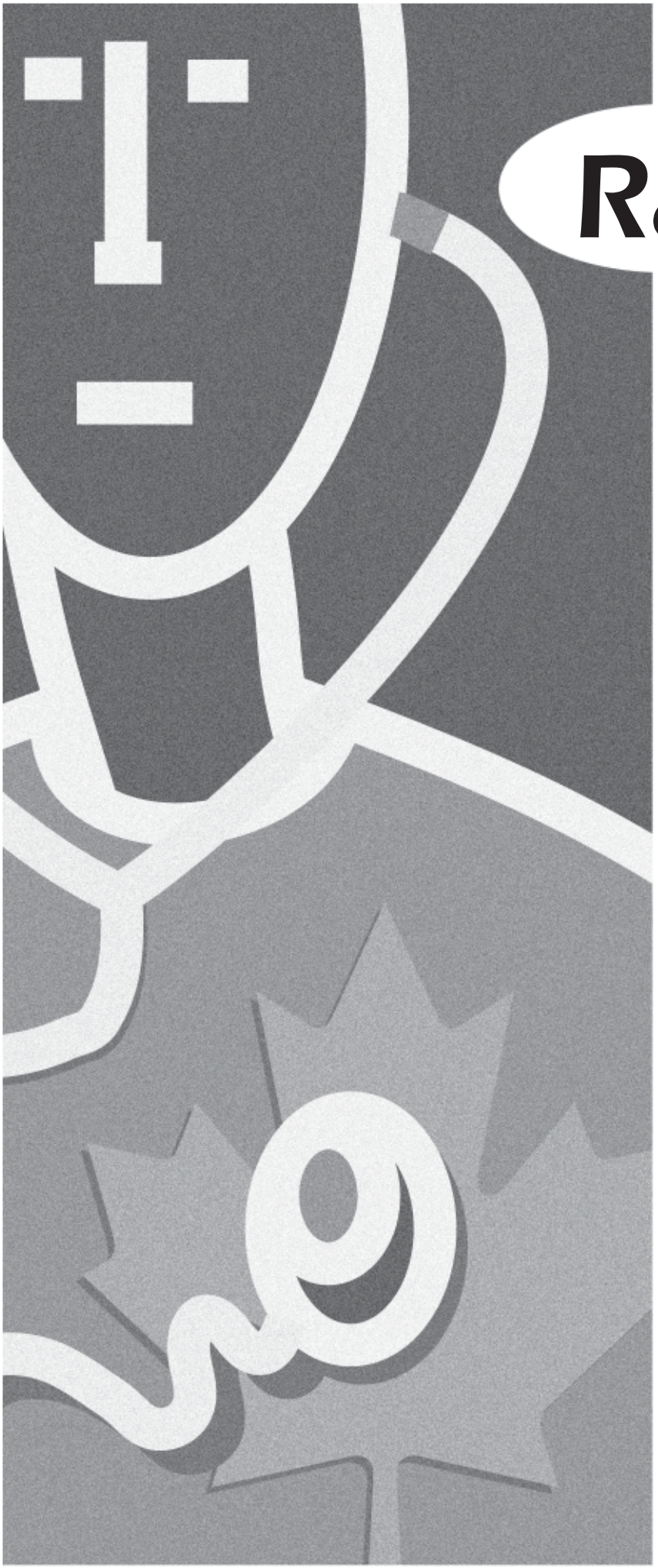
Erratum

Volume 15, Number 4

Creutzfeldt-Jakob Disease
Page 50

The statement, "Between 1979 and 2001, 599 deaths in Canada were attributed to Creutzfeldt-Jakob disease, only one of which was BSE-related," is incorrect. The BSE-related death occurred in 2002.



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Second-hand smoke exposure—who's at risk?

Claudio E. Pérez

Abstract

Objectives

This article examines exposure to second-hand smoke (SHS) in 2003 in various settings by age and sex, and compares exposure indicators by province and health region.

Data source

The data are from the 2000/01 and 2003 Canadian Community Health Survey, conducted by Statistics Canada.

Analytical techniques

Rates of exposure to SHS among non-smokers are calculated by sex, age and location for the household population aged 12 or older. Rates of exposure at work are examined for employed non-smokers aged 15 or older. Smoking prevalence is expressed as a percentage of the household population aged 12 or older.

Main results

In 2003, 33% of non-smokers reported that they were regularly exposed to SHS. The risk of exposure was greatest in public spaces, but regardless of setting, rates of exposure were higher for men than women. Exposure rates varied by age and peaked in young adulthood. However, at home and at work, the younger the non-smokers, the more likely they were to be exposed to SHS. Disparities in SHS exposure by province/territory and by health region were substantial.

Key words

environmental tobacco smoke (ETS), passive smoking, involuntary smoking, secondary smoking

Author

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The negative health effects of exposure to second-hand smoke (SHS) are well-documented[1-7] and widely recognized. According to Statistics Canada's 1996/97 National Population Health Survey, about three-quarters of Canadians believed that second-hand smoke can cause health problems in non-smokers. Most also agreed that non-smokers should be provided with a smoke-free work environment, an opinion that was shared by a large majority of smokers.[8]

Public health campaigns designed to increase awareness of the dangers of second-hand smoke have proliferated, and many jurisdictions have enacted legislation to restrict smoking in public places and at work.[9] In the context of attitudinal and legislative change, it is useful to determine who remains at risk of SHS exposure and to what extent. This analysis uses data from the 2000/01 and 2003 Canadian Community Health Survey (CCHS) to address these issues (see *Methods* and *Definitions*).

One-third

In 2003, 33 % of non-smokers reported that in the last month they had been exposed to second-hand smoke on most days in at least one of four locations: in public, at work, at home or in private vehicles (Table 1). The most common setting for SHS exposure (respondents could indicate more than one) was public places, reported by 20%, followed by home and work (both 11%) and in private vehicles (10%). For the most part, these exposure rates had not changed from two years earlier (data not shown). The proportion of non-smokers exposed to SHS at work was the exception: in 2000/01, the rate had been higher at 13%.

In all venues, males were more likely than females to be exposed to second-hand smoke (Chart 1). For example, 23% of male non-smokers versus 17% of female non-smokers reported having been exposed to SHS in public places. While differences between the sexes were also statistically significant for exposure at home and in private vehicles, the gaps were narrower.

The most striking contrast in SHS exposure rates by sex was at work. In 2003, 16% of employed men who did not smoke worked in environments where smoking was not restricted, compared with 6% of their female counterparts. Both figures, however, were down from two years earlier when

Methods

Data source

The analysis for this article is based on data from the 2000/01 and 2003 Canadian Community Health Survey (CCHS), conducted by Statistics Canada. The CCHS collects cross-sectional information every two years. The survey covers the household population aged 12 or older in the provinces and territories, except residents of Indian reserves, Canadian Forces bases, and some remote areas.

The first cycle (cycle 1.1) began in September 2000 and continued over 14 months. The majority of interviews were conducted face-to-face. The response rate for the first cycle was 84.7%, yielding a sample of 131,535 respondents. This analysis uses data for the population aged 12 or older living in the provinces and territories. Among the respondents, 95,339 were non-smokers (weighted to represent approximately 19.1 million individuals), and therefore, at risk of exposure to second-hand smoke.

Cycle 2.1 began in January 2003 and ended in December that year. Most interviews were conducted by telephone. The response rate was 80.6%, yielding a sample of 135,573 respondents. Among the respondents, 102,950 were non-smokers (weighted to represent about 20.4 million individuals).

A description of the CCHS methodology is available in a published report.[10]

Analytical techniques

The prevalence of smoking was expressed as a percentage of the household population aged 12 or older. Prevalence rates for exposure to second-hand smoke were expressed as a percentage of non-smokers. Smoking restrictions at work were examined for the non-smoking employed population aged 15 or older. Answers coded as "refusal," "don't know," "not stated" or "not applicable" were excluded from calculations.

To account for the complex survey design, coefficients of variation and p-values for differences between estimates were calculated using the bootstrap technique.[11-13]

Limitations

The data on which this article is based are self-reported. Respondents may give answers that they consider to be socially acceptable, but that are not accurate descriptions of their behaviour.

The question used to determine exposure at home does not address second-hand smoke directly, but rather asks about the smoking habits of other household members (see *Definitions*). It is possible that people who smoke at home do so only in the absence of the non-smoker, or in isolated areas, such as the garage.

Because the CCHS covers only the population aged 12 or older, this analysis could not examine exposure to second-hand smoke among children younger than 12.

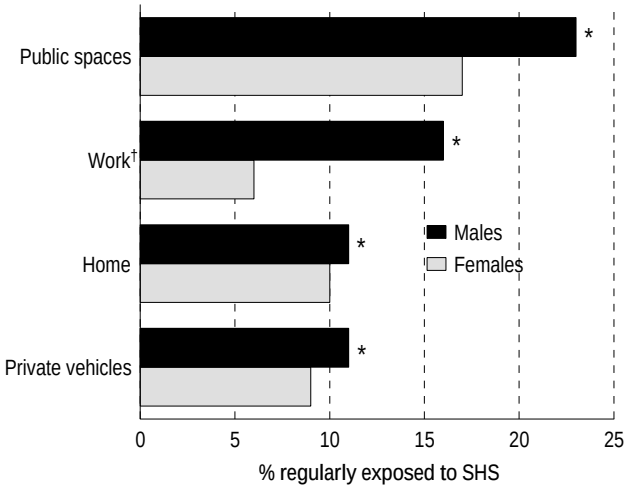
The boundaries of health regions do not necessarily coincide with municipalities that have smoking legislation.

Table 1
Percentage of non-smokers regularly exposed to second-hand smoke in selected locations and smoking prevalence, by province/territory, household population aged 12 or older, 2003

	Second-hand smoke exposure					
	Total (at least one location)	Public spaces	Work†	Home	Private vehicles	Smoking prevalence‡
Canada	33	20	11	11	10	23
Newfoundland	35*	14*	16*	14*	15*	24
Prince Edward Island	34	13*	18*	12	13	24
Nova Scotia	32	16*	14	13	13*	24
New Brunswick	35*	19	16*	13*	12*	25
Québec	41*	27*	11	16*	12*	26*
Ontario	30*	18*	9*	9*	10	22*
Manitoba	33	20	13	11	11	23
Saskatchewan	38*	24*	20*	11	11	24
Alberta	35*	21	15*	9*	10	23
British Columbia	23*	12*	10	6*	7*	19*
Yukon	39*	23	16	13	15	28
Northwest Territories	47*	32*	10	15	18*	37*
Nunavut	40	21	6	15	18	65*

Data source: 2003 Canadian Community Health Survey
† Employed non-smokers aged 15 or older in workplace with few or no smoking restrictions
‡ Daily or occasional
** Significantly different from estimate for Canada*

Chart 1
Percentage of non-smokers regularly exposed to second-hand smoke in selected locations, by sex, household population aged 12 or older, Canada, 2003



Data source: 2003 Canadian Community Health Survey
† Employed non-smokers aged 15 or older in workplace with few or no smoking restrictions
** Significantly higher than estimate for women ($p < 0.05$)*

18% of male and 8% of female workers who did not smoke reported workplace exposure (data not shown). Male workers' greater SHS exposure reflects their comparatively high representation in occupations such as trades/transport/equipment operation and farming/forestry/fishing/mining (data not shown). Much of this work is performed outdoors where smoking restrictions usually do not apply.

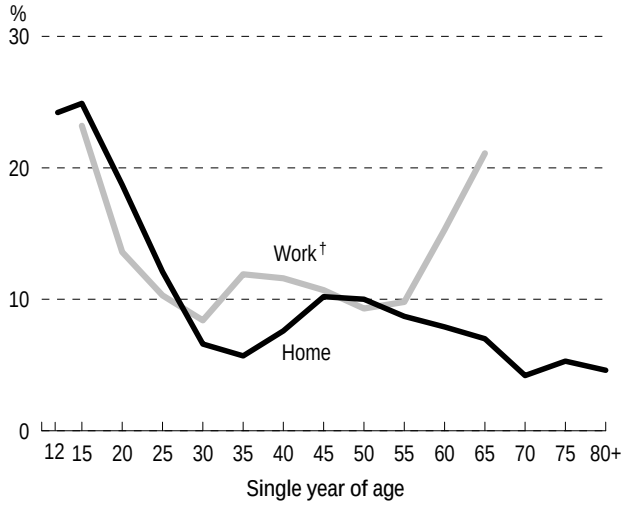
Youth most at risk

Age is closely associated with exposure to second-hand smoke (Chart 2). In 2003, the percentage of non-smokers regularly exposed to SHS in at least one location was 37% at age 12; at age 20, the proportion was 55%. From ages 20 to 30 exposure rates fell sharply to level off around 30%, and remained in that range until about age 60. At older ages, exposure rates dropped even more, and by age 80 were around 10%. This pattern generally reflects the activities in which people engage at different ages and the settings in which they are likely to be, either out of necessity or by choice.

Chart 2
Percentage of non-smokers regularly exposed to second-hand smoke in at least one location,† by single year of age, household population aged 12 or older, Canada, 2003

Data source: 2003 Canadian Community Health Survey
† Public spaces, work, home, private vehicles

Chart 3
Percentage of non-smokers regularly exposed to second-hand smoke at home or work, by single year of age, household population aged 12 or older, Canada, 2003



Data source: 2003 Canadian Community Health Survey
† Employed non-smokers aged 15 or older in workplace with few or no smoking restrictions

Few options at home

The younger the person, the fewer the options for avoiding second-hand smoke, particularly at home. In 2003, about a quarter of non-smoking 12- to 15-year-olds were regularly exposed to SHS in their home. The percentage declined with advancing age to about 6% among people in their mid-thirties and then rose to about 10% for those in their mid-forties (Chart 3). An almost steady decline thereafter brought the figure down to about 5% at age 70 or older, which may reflect spouses surviving a smoking partner. (Comparable data about SHS exposure for children younger than 12 are not available from the CCHS.)

Exposure at work

The highest rates of workplace second-hand smoke exposure for non-smokers in 2003 were among the youngest and oldest workers. From their mid-teens through their twenties, non-smokers' SHS workplace exposure rates dropped, and thereafter, stabilized. After age 55, SHS workplace exposure rates rose.

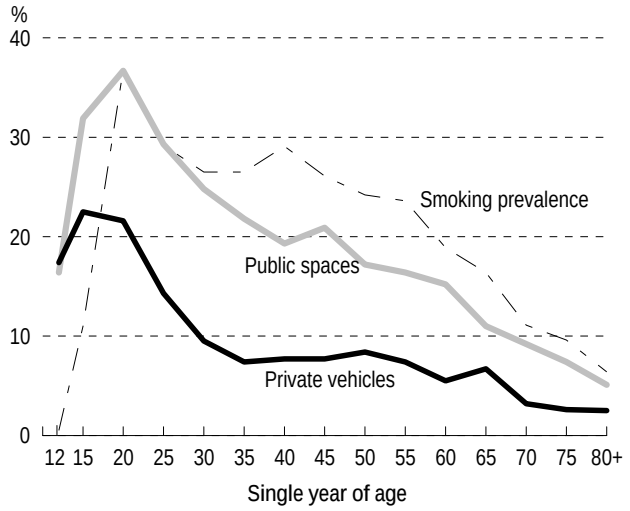
Over half of workers aged 15 to 20 were employed in sales and service, which includes restaurants and bars where smoking may not be restricted (data not shown). Substantial shares of older workers were in sales/service or trades/transport/equipment operation, which have relatively few smoking restrictions.

Going out/Settling down/Getting old

Non-smokers' exposure to second-hand smoke in public spaces and in private vehicles followed roughly the same age patterns, with rates rising through adolescence (Chart 4). In 2003, the proportion of 12-year-olds regularly exposed to SHS in public spaces was 16%, and in private vehicles, 17%; among non-smokers who were aged 19, the corresponding figures were much higher at 37% and 23%. This rise in exposure rates parallels an increase in smoking prevalence throughout the teenage years. Fewer than 1% of 12-year-olds were smokers in 2003, compared with 37% of 20-year-olds. Consequently, even non-smoking teenagers may have friends who smoke. As well, time spent in social situations where smoking may be unrestricted tends to increase.

Non-smokers' SHS exposure in public spaces and private vehicles dropped in their early twenties.

Chart 4
Percentage of non-smokers regularly exposed to second-hand smoke in public spaces or in private vehicles, by single year of age, household population aged 12 or older, Canada, 2003



Data source: 2003 Canadian Community Health Survey

Family formation often occurs at these ages, the results of which may be less time in social settings where smoking is allowed, or a spouse changing his or her smoking habits.

The low SHS exposure rates among the elderly may be attributable to even less time spent in venues where smoking is permitted.

Provincial/Territorial differences

Levels of second-hand smoke exposure vary among the provinces and territories. Moreover, the patterns are not always consistent, in that a province with a significantly high rate of exposure in one setting may have a significantly low rate in another (Table 1).

In 2003, Ontario and British Columbia stood out with SHS exposure in public places, at work, at home and in private vehicles either matching or significantly below the national level. These two provinces also had the lowest proportions of daily or occasional smokers. Québec, on the other hand, with a high prevalence of smoking, also had high rates of SHS exposure in public spaces, at home and in private vehicles.

The Atlantic provinces had significantly low exposure rates in public spaces, but significantly high rates in at least one of the other locations. The exception was New Brunswick with an SHS exposure rate in public spaces that matched the national level, and significantly high rates in each of the other three venues.

Among the three Prairie provinces, Manitoba's exposure rates in all settings did not differ significantly from the national figures. Alberta had a high rate of workplace exposure, but a low rate at home. In Saskatchewan, rates were high in public spaces and at work.

In the Northwest Territories, SHS exposure was high in public spaces and in private vehicles. In the Yukon and Nunavut, rates in all locations were similar to those for Canada as a whole, even though Nunavut had the highest proportion of daily and occasional smokers.

Definitions

In cycles 1.1 and 2.1 of the Canadian Community Health Survey, respondents were asked, "At the present time, do you smoke cigarettes daily, occasionally or not at all?" Those who said they smoked daily or occasionally were defined as *current smokers*.

Cycle 1.1 respondents were asked, "Does anyone in this household smoke regularly inside the house?" (Yes/No). In cycle 2.1, the question was, "Including both household members and regular visitors, does anyone smoke inside your home every day or almost every day?"

Respondents aged 12 or older were asked, "In the past month, were you exposed to second-hand smoke every day or almost every day:

... in a car or other private vehicle?" (Yes/No)

... in public places (such as bars, restaurants, shopping malls, arenas, bingo halls, bowling alleys)? (Yes/No)

Respondents aged 15 or older who were employed were asked, "At your place of work, what are the restrictions on smoking?" The choices read to the respondent were:

1. Restricted completely
2. Allowed in designated areas (smokers must go to specific areas because smoking is generally not allowed)
3. Restricted only in certain places (for instance, where flammable materials are stored)
4. Not restricted at all

Respondents who indicated either of the first two choices were defined as having *smoking restrictions at work*.

While rates of second-hand smoke exposure in specific venues may be significantly high or low at the provincial level, this is not necessarily the case in every health region within that province. A single province may contain health regions where rates of SHS exposure were significantly high and other health regions where rates were low (Appendix Table A).

Legislation designed to curb SHS exposure obviously cannot extend to homes or private vehicles, but hundreds of municipalities have laws that restrict smoking in public places and at work.[14-20] However, bylaws and regulations vary in scope, and levels of compliance differ across communities.[21] Low rates of SHS exposure in public spaces and in the workplace generally tend to be more common in larger urban areas, and high rates, in rural or northern areas where substantial numbers of residents are engaged in primary industries.

Concluding remarks

Despite steady declines in the prevalence of smoking, widespread awareness of the hazards of second-hand smoke, and legislative efforts to curb exposure, in 2003, 20% of non-smokers were regularly exposed to second-hand smoke in public spaces, and 11% of employed non-smokers worked in environments without smoking restrictions.

SHS exposure rises through adolescence to peak in young adulthood. However, exposure varies with the venue, and parallels activities that tend to occur at different ages. Exposure also reflects different degrees of choice.

In some instances, non-smokers have no options. For example, a 12-year-old living in a household where parents smoke, or a worker employed in an environment where smoking is not restricted, has little control. In other cases, SHS exposure may be voluntary. Teenagers may spend time in social situations where smoking is permitted or drive with friends who smoke.

The relationship between age and SHS exposure at home is striking. In 2003, the percentage of 12-year-olds regularly exposed to SHS in their home exceeded the percentage exposed in public spaces: 24% versus 16%.

Legislation does not cover smoking in private locales such as homes or vehicles. Nonetheless, the increasing restrictions on smoking in public places and in the workplace suggest that awareness of the potential harm is growing. Restrictions on smoking in these locations may ultimately affect behaviour in private settings.[22,23]

References

1 US Department of Health and Human Services. *The Health Consequences of Involuntary Smoking*. A Report of the Surgeon General, 1986. DHHS Pub. No. (PHS) 87-8398. Washington, DC: US Department of Health and Human Services, 1987.

2 National Research Council: Committee on Passive Smoking. *Environmental Tobacco Smoke. Measuring Exposures and Assessing Health Effects*. Washington, DC: National Academy Press, 1986.

3 International Agency for Research on Cancer. *Tobacco Smoking*. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 38. Lyon, France: World Health Organization, International Agency for Research on Cancer, 1986.

4 US Department of Health and Human Services. *Reducing the Health Consequences of Smoking: 25 Years of Progress*. A Report of the Surgeon General. DHHS Pub. No. (CDC). Rockville, Maryland: Public Health Services, Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health, 1989.

5 National Cancer Institute. *Health Effects of Exposure to Environmental Tobacco Smoke: The Report of the California Environmental Protection Agency*. Smoking and Tobacco Control Monograph No. 10. (NIH. No. 99-4645) Bethesda, Maryland: US Department of Health and Human Services, National Institutes of Health, National Cancer Institutes, 1999.

6 US Environmental Protection Agency. *Respiratory Health Effects of Passive Smoking (Also Known as Exposure to Secondhand Smoke or Environmental Tobacco Smoke - ETS)* (EPA/600/6-90/006F) Washington, DC: US Environmental Protection Agency, 1992.

7 International Agency for Research on Cancer. *Tobacco Smoke and Involuntary Smoking*. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 83. Lyon, France: International Agency for Research on Cancer, 2002.

8 Ross N, Pérez C. Attitudes toward smoking. *Health Reports* (Statistics Canada, Catalogue 82-003) 1998; 10(3): 23-33.

9 Health Canada. The National Strategy: Moving Forward. The 2003 Progress Report on Tobacco Control. Progress in Strategic Directions. Available at *http://www.hc-sc.gc.ca/hecs-sesc/tobacco/policy/prog03/05_progress.html*.

10 Béland Y. Canadian Community Health Survey—Methodological overview. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; 13(3): 9-14.

11 Rao JNK, Wu CFJ, Yue K. Some recent work on resampling methods for complex surveys. *Survey Methodology* (Statistics Canada, Catalogue 12-001) 1992; 18(2): 209-17.

12 Rust K, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5: 281-310.

13 Yeo D, Mantel H, Liu TP. Bootstrap variance estimation for the National Population Health Survey. *American Statistical Association: Proceedings of the Survey Research Methods Section*. Baltimore, August 1999.

14 The City of Calgary. Guide to Calgary's updated Smoking Bylaw. Available at *http://www.calgary.ca/docgallery/BU/environmental_management/smoking_brochure_final1.pdf*.

15 The City of Edmonton. Bylaw 13333 Smoking Bylaw. Available at *http://www.edmonton.ca/smokingbylaw/smoking_bylaw_13333.pdf*.

16 City of Ottawa. Public Places By-law - Summary. Available at *http://ottawa.ca/city_services/bylaws/1_3_3_1_en.shtml*.

17 City of Ottawa. Workplaces By-law – Summary. Available at *http://ottawa.ca/city_services/bylaws/1_3_3_2_en.shtml*.

18 Drope J, Glantz S. British Columbia Capital Regional District 100% smokefree bylaw: a successful public health campaign despite industry opposition. *Tobacco Control* 2003; 12(3): 264-8.

19 Santé et Services sociaux du Québec. Plan Québécois de lutte contre le tabagisme 2001-2005. Available at *http://www.msss.gouv.qc.ca*.

20 Northwest Territories Health and Social Services. Smoke Alarm. A Summary Report on Smoking in the Northwest Territories. Available at *http://www.hlthss.gov.nt.ca/content/Publications/Reports/Tobacco/tobacco/tobacco.pdf*.

21 Health Canada. The Facts about Tobacco. Impact of Workplace Smoking Restriction—Compliance Issues. Available at *http://www.hc-sc.gc.ca/hecs-sesc/tobacco/facts/workplace/part3_compliance.html*.

22 Health Canada. The Facts about Tobacco. Impact of Workplace Smoking Restriction—Impact on Cigarette Consumption and Uptake. Available at *http://www.hc-sc.gc.ca/hecs-sesc/tobacco/facts/workplace/part3_impact_consumption.html*.

23 Health Canada. The Facts about Tobacco. Impact of Workplace Smoking Restriction—Impact on Smoking Prevalence. Available at *http://www.hc-sc.gc.ca/hecs-sesc/tobacco/facts/workplace/part3_impact_prev.html*.

Appendix

Table A
Percentage of non-smokers regularly exposed to second-hand smoke in public spaces and at work and smoking prevalence, by health region, household population aged 12 or older, 2003

Health region (code)	Second-hand smoke exposure		Smoking prevalence[‡]
	Public spaces	Work[†]	
	%		
Canada	20	11	23
Newfoundland	14*	16*	24
Health and Community Services St. John's Region (1001)	15	9[E1]	22
Health and Community Services Eastern Region (1002)	13*	17	26
Health and Community Services Central Region (1003)	12*	20	22
Health and Community Services Western Region (1004)	14	25*	26
Grenfell Regional Health Services Board (1005)	8[E2]*	36[E1]*	23
Health Labrador Corporation (1006)	20	8[E2]	34
Prince Edward Island	13*	18*	24
West Prince (1101)	14[E1]	28[E1]	28
East Prince (1102)	17	22	24
Queens (1103)	12*	11[E1]	22
Kings (1104)	9[E1]*	26*	26
Nova Scotia	16*	14	24
Zone 1 (1201)	14	28*	26
Zone 2 (1202)	12*	21[E1]	28
Zone 3 (1203)	11*	20[E1]	28
Zone 4 (1204)	8[E1]*	15[E1]	23
Zone 5 (1205)	18	12[E1]	28
Zone 6 (1206)	19	9[E1]	19
New Brunswick	19	16*	25
Region 1 (1301)	15	12	25
Region 2 (1302)	24	16	23
Region 3 (1303)	13*	14[E1]	26
Region 4 (1304)	22	24[E1]	31
Region 5 (1305)	26	18[E1]	27
Region 6 (1306)	25	25*	26
Region 7 (1307)	17[E1]	21[E1]	27
Québec	27*	11	26*
Région du Bas-Saint-Laurent (2401)	32*	10[E1]	22
Région du Saguenay - Lac-Saint-Jean (2402)	34*	12[E1]	27
Région de Québec (2403)	26*	7*	25
Région de la Mauricie et du Centre-du-Québec (2404)	30*	11[E1]	23
Région de l'Estrie (2405)	25	11[E1]	24
Région de Montréal-Centre (2406)	24*	7*	27*
Région de l'Outaouais (2407)	24	11	26
Région de l'Abitibi-Témiscamingue (2408)	30*	14[E1]	27
Région de la Côte-Nord (2409)	32*	21[E1]	29
Région du Nord-du-Québec (2410)	39*	14[E1]	29
Région de la Gaspésie - Îles-de-la-Madeleine (2411)	28	17	27
Région de la Chaudière-Appalaches (2412)	27*	17[E1]	24
Région de Laval (2413)	28*	10	28
Région de Lanaudière (2414)	29*	14	28*
Région des Laurentides (2415)	32*	12	28
Région de la Montérégie (2416)	26*	12	25
Région des Terres-Cries-de-la-Baie-James (2418)	33*	17	46*
Ontario	18*	9*	22
District of Algoma Health Unit (3526)	27	9[E1]	27
Brant County Health Unit (3527)	14	9[E1]	26
Durham Regional Health Unit (3530)	21	9	25
Elgin-St Thomas Health Unit (3531)	18	15[E1]	24
Grey Bruce Health Unit (3533)	7[E1]*	13[E1]	19
Haldimand-Norfolk Health Unit (3534)	22	29*	29
Haliburton, Kawartha, Pine Ridge District Health Unit (3535)	22	13[E1]	22
Halton Regional Health Unit (3536)	14*	8[E1]	21
City of Hamilton Health Unit (3537)	17	11	23
Hastings and Prince Edward Counties Health Unit (3538)	19	13[E1]	22
Huron County Health Unit (3539)	21	24[E1]	22
Chatham-Kent Health Unit (3540)	18	13[E1]	26
Kingston, Frontenac and Lennox and Addington Health Unit (3541)	18	12	26
Lambton Health Unit (3542)	18	15[E1]	24
Leeds, Grenville and Lanark District Health Unit (3543)	18	14[E1]	27
Middlesex-London Health Unit (3544)	16	10	20
Muskoka-Parry Sound Health Unit (3545)	16	20[E1]	22
Niagara Regional Area Health Unit (3546)	20	11	24
North Bay and District Health Unit (3547)	23	10[E1]	25
Northwestern Health Unit (3549)	25	11[E1]	27
City of Ottawa Health Unit (3551)	14*	5[E1]*	20
Oxford County Health Unit (3552)	16	15	24
Peel Regional Health Unit (3553)	19	8	21
Perth District Health Unit (3554)	14[E1]	10[E1]	23
Peterborough County-City Health Unit (3555)	18	15[E1]	24
Porcupine Health Unit (3556)	27	17	31*
Renfrew County and District Health Unit (3557)	17	18	28
Eastern Ontario Health Unit (3558)	17	12	25
Simcoe County District Health Unit (3560)	20	14	25
Sudbury and District Health Unit (3561)	18	7[E1]	25
Thunder Bay District Health Unit (3562)	28*	9[E1]	29
Timiskaming Health Unit (3563)	25	17[E1]	29
Waterloo Health Unit (3565)	12*	10	23
Wellington-Dufferin-Guelph Health Unit (3566)	17	13[E1]	21
Windsor-Essex County Health Unit (3568)	19	8[E1]	21
York Regional Health Unit (3570)	18	8*	21
City of Toronto Health Unit (3595)	19	7*	20
Manitoba	20	13	23
Winnipeg Regional Health Authority (4610)	19	8	22
Brandon Regional Health Authority (4615)	6[E2]*	9[E1]	23
North Eastman Regional Health Authority (4620)	14[E1]	17[E1]	21

Health region (code)	Second-hand smoke exposure: Public spaces	Second-hand smoke exposure: Work[†]	Smoking pre-valence[‡]
		%	
South Eastman Regional Health Authority (4625)	25	21	23
Interlake Regional Health Authority (4630)	22	18[E1]	23
Central Regional Health Authority (4640)	18	24*	22
Assiniboine Regional Health Authority (4645)	20	25*	20
Parkland Regional Health Authority (4660)	27	28*	23
Norman Regional Health Authority (4670)	33*	20[E1]	29
Burntwood/Churchill Regional Health Authority[§] (4680)	40*	15[E1]	44
Saskatchewan	24*	20*	24
Sun Country Regional Health Authority (4701)	26	33*	24
Five Hills Regional Health Authority (4702)	32*	22	24
Cypress Regional Health Authority (4703)	24	25	19
Regina Qu'Appelle Regional Health Authority (4704)	22	13	24
Sunrise Regional Health Authority (4705)	30*	29*	24
Saskatoon Regional Health Authority (4706)	24	15	24
Heartland Regional Health Authority (4707)	16	36*	19
Kelsey Trail Regional Health Authority (4708)	26	26[E1]	21
Prince Albert Parkland Regional Health Authority (4709)	24	27*	25
Prairie North Regional Health Authority (4710)	20	29*	26
Athabasca/Keewatin/Mamawetan Regional Health Authority[††] (4714)	30	19[E1]	42
Alberta	21	15*	23
Chinook Regional Health Authority (4820)	17	20	20
Palliser Health Region (4821)	20	20	28
Calgary Health Region (4822)	22	12	20
David Thompson Regional Health Authority (4823)	20	23*	27
East Central Health (4824)	27	29*	23
Capital Health (4825)	19	10	23
Aspen Regional Health Authority (4826)	30*	29*	28
Peace Country Health (4827)	26	22*	25
Northern Lights Health Region (4828)	26	19	30
British Columbia	12*	10	19*
East Kootenay (5911)	10[E1]*	15[E1]	22
Kootenay-Boundary (5912)	20[E1]	16[E1]	21
Okanagan (5913)	12*	15	22
Thompson/Cariboo (5914)	9*	14	20
Fraser East (5921)	13*	16	19
Fraser North (5922)	12*	10	18
Fraser South (5923)	12*	8[E1]	15
Richmond (5931)	15	7[E1]	14*
Vancouver (5932)	14*	7[E1]	19*
North Shore/Coast Garibaldi (5933)	12*	6[E1]	15*
South Vancouver Island (5941)	8*	8[E1]	18
Central Vancouver Island (5942)	13	6[E2]*	23
North Vancouver Island (5943)	13	20	22
Northwest (5951)	14[E1]	13[E2]	26
Northern Interior (5952)	12*	15	24
Northeast (5953)	19	13[E1]	22
Yukon Territory (6001)	23	16	28
Northwest Territories (6101)	32*	10[E1]	37*
Nunavut (6201)	21[E1]	F	65

Data source: 2003 Canadian Community Health Survey
† Employed non-smokers aged 15 or older in workplace with few or no smoking restrictions
‡ Daily or occasional
§ Churchill Regional Health Authority (4690) is combined with Burntwood Regional Health Authority (4680).
†† Athabasca Health Authority (4713), Mamawetan Churchill River Regional Health Authority (4711) and Keewatin Yatthé Regional Health Authority
** Significantly different from estimate for Canada ($p < 0.05$).*
E1 Coefficient of variation 16.6% to 25.0%
E2 Coefficient of variation 25.1% to 33.3%
F Coefficient of variation greater than 33.3%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Shorter hospital stays for breast cancer

C. Ineke Neutel, Ru-Nie Gao, Leslie Gaudette and Helen Johansen

Abstract

Objectives

This article examines trends in and factors influencing the length of stay for female breast cancer patients who were hospitalized between 1981 and 2000.

Data sources

The hospital data are from the Hospital Morbidity Database and the Health Person-oriented Information Database, both maintained by Statistics Canada. Data on new cases of breast cancer are from the Canadian Cancer Registry and the National Cancer Incidence Reporting System.

Analytical techniques

Descriptive analyses present length of stay for all hospital admissions with a primary diagnosis of breast cancer, by four-year period and by the patient's age, cancer stage, comorbid conditions and surgical procedures. Logistic regression is used to examine associations between these factors and length of stay.

Main results

Since the early 1980s, the average length of stay in hospital for female breast cancer has fallen from 15.1 to 4.5 days. Declines occurred regardless of age group, cancer stage, procedure and comorbid conditions. Average stays first began to fall for less serious cases, but were eventually apparent for even the most serious.

Key words

mastectomy, breast-conserving surgery, comorbidity

Authors

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Over the last two decades, the incidence of female breast cancer—the number of new cases diagnosed each year—has risen.[1] Yet when health care resources allocated to breast cancer are measured in annual hospital days, a consistent and considerable decline is evident. This examination of 20 years of breast cancer hospitalization data suggests that the decrease was largely implemented through a reduction in breast cancer patients' average length of stay. Since length of stay is key in determining hospital use,[2] this decrease in the use of hospital resources, which coincided with an apparent increase in the demand for treatment for breast cancer, may have implications for health care planning.

With information from Statistics Canada's Hospital Morbidity Database, this article traces trends in length of stay for female breast cancer patients between 1981 and 2000, identifies determinants of length of stay, and examines whether the importance of these determinants changed over the period (see *Methods and Definitions*). Based on data for 1994 to 2000, 60-day readmission rates for women who had a mastectomy or breast-conserving surgery are also presented.

Methods

Data sources

The data are from the Hospital Morbidity Database, which is maintained by Statistics Canada. This database contains records for all in-patient hospitalizations in each province. At the time of discharge, hospitals complete a discharge summary for each hospital stay. In this analysis, these records were accumulated for fiscal years 1981/82 to 2000/01 (April 1, 1981 to March 31, 2001) (Appendix Table A). For readability, fiscal years are referred to as single years; for example, fiscal year April 1, 1981 to March 31, 1982 is 1981.

Some results are based on data from the Health Person-oriented Information Database, which allow analysis of records for individual patients. These data are available beginning in 1994/95.

Data on new cases of breast cancer are from the Canadian Cancer Registry and its predecessor, the National Cancer Incidence Reporting System.

Analytical techniques

The analysis includes all in-patient hospital admissions with a primary diagnosis of breast cancer, regardless of the type of treatment or surgery patients received. All hospital visits with a primary diagnosis of breast cancer, based on the *International Classification of Diseases, Ninth Revision* (ICD-9),[3] were selected. These codes were also used to categorize admissions by breast cancer stage: in-situ, localized, regional or distant.

The descriptive analyses are presented as frequencies and percentages. Mean length of stay was calculated by dividing the total number of days that women admitted for breast cancer spent in hospital by the number of admissions. Because a small proportion of hospital stays were very long (sometimes several years), length of stay was capped at 365 days.

Except for the rehospitalization data, the unit of analysis is hospital admissions rather than individuals, so women hospitalized more than once in a year are counted separately each time.

Using logistic regression models, the effect of selected variables on length of stay was estimated. Length of stay was dichotomized at the median (lower than/equal to or higher than) so that it could be used as a categorical rather than continuous variable.[4] For each variable, the category associated with the shorter length of stay was designated as the reference group.

The time that breast cancer patients spend in hospital is affected by the presence of other medical conditions, even when those conditions are unrelated to breast cancer.[5] To control for comorbidity in this analysis, the Charlson Index was used.[6-9] This index assigns a value to each condition according to severity. The values are then accumulated to produce a total score.

Limitations

The analysis is limited by the data available from the Hospital Morbidity Database and the Health Person-oriented Information Database, both of which are based on administrative data and consist of relatively few variables. For example, cancer stages for this study were derived from ICD-9 diagnostic coding, although the more precise staging done for cancer clinic visits would have been preferable. If breast cancer was not the primary diagnosis, but was recorded in another field, that record would have been excluded from this study. However, it is not always possible to disentangle the relationships between diagnoses (for example, between a metastatic tumour and another primary cancer). As well, hospital records do not contain complete data on co-morbid conditions. Information is recorded only for conditions that pertain to the care delivered (and billed for) during a patient's hospital stay.

The lack of information about day surgery is a major limitation of this analysis. Over the last decade, a growing proportion of breast-conserving surgery has been performed as day surgery,[10] and in some places, this is even occurring for mastectomies.[11] Consequently, the results of this analysis are likely skewed, since presumably, the least severe and least complex cases are selected for day surgery, while the in-hospital cases may be expected to have a different case-mix. However, from the perspective of resources allocated to hospital inpatients, the results remain valid.

Information about many other variables that can affect length of stay was not available: for instance, the supply of acute care hospital beds, the availability of alternate facilities for the most serious cases, and staffing levels. Local variations in access to services that might affect stays, such as home care, could not be taken into account. Nor was information available about clinical practice styles, which can vary from physician to physician, from hospital to hospital, and from region to region. And factors relating to the efficiency of running a hospital,[12] such as admission and discharge procedures, could not be considered.

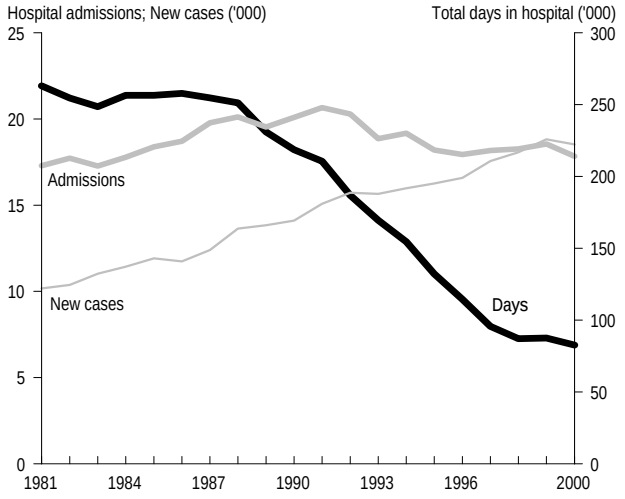
Person-linked information is available only from 1994/95, so readmission rates could not be calculated for the same period as the rest of the study (from 1981/82).

Shorter stays/Fewer days

Between 1981 and 2000, the number of new breast cancer cases diagnosed each year almost doubled, rising from 10,175 to 18,523 (Chart 1). The number of hospital admissions that were attributable to breast cancer rose during the first 10 years of this period, but then levelled off. In the 1980s, the annual number of hospital admissions for breast cancer exceeded the annual number of new cases by about 50%. By 2000, new cases of breast cancer slightly outnumbered hospital admissions for the disease.

The two decades from 1981 through 2000 saw a total of 388,146 hospital admissions with a primary diagnosis of breast cancer; together, these admissions accounted for 3.87 million hospital days. The admissions were distributed relatively equally over the 20 years, with each four-year period representing about 20% of the total (Table 1). The distribution of days was much less even: the earliest period, 1981-1984, accounted for 27% of the total number of hospital days, while the most recent, 1997-2000, represented just 9%. The difference between the distribution of hospital admissions and hospital days is essentially an effect of a decline in breast cancer patients' average length of stay, which fell from 14.5 days in the first period to 4.7 days in the last (Table 2).

Chart 1
Annual number of hospital admissions, days in hospital and new cases, breast cancer, Canada, 1981 to 2000



Data sources: Hospital Morbidity Database, 1981/82 to 2000/01; National Cancer Incidence Reporting System, 1981 to 1991; Canadian Cancer Registry, 1992 to 2000

Table 1
Percentage distribution of hospital admissions and hospital days for breast cancer,† Canada, by four-year period, 1981-1984 to 1997-2000

	Admissions	Days
Total 1981-2000 (number)	388,146	3,865,730
	%	%
	100.0	100.0
1981-1984	18.2	26.0
1985-1988	20.2	26.0
1989-1992	21.5	22.3
1993-1996	20.1	15.1
1997-2000	20.0	9.4

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
Note: Because of rounding, detail may not add to total
† Primary diagnosis

Of course, during these two decades, the average length of stay for all causes of hospitalization dropped as advancements in surgical techniques and a general move toward day surgery reduced the need for prolonged hospital care. Nonetheless, the decline for breast cancer patients was much steeper than the decline in average length of stay for all causes combined, which fell from around 11.5 days to just under 9 days.

This comparison with hospital stays overall is necessarily crude, as a variety of factors affect different diagnoses in different ways. Yet even in an era of general decline, the downturn in length of stay for breast cancer was perhaps somewhat steeper than might have been anticipated. In the early 1980s, the average stay for a breast cancer patient was about three days longer than the average for all hospital patients. However, by the end of the period, the average for breast cancer patients was only about half the overall average.

Provincial declines

Average hospital stays for breast cancer patients decreased in every province, but the extent of the decline varied. In the early 1980s, averages ranged from 11.6 days in British Columbia to 17.4 days in Québec (Table 2, Chart 2). By 1997-2000, the longest stays for breast cancer patients were in Nova Scotia and Québec, averaging 7.8 and 7.3 days, respectively. The shortest stays were in Alberta (2.9 days), Ontario (3.2) and British Columbia (3.4).

Over the two decades, the largest drops in average hospital stays for breast cancer patients were in Alberta and Ontario, and the smallest, in Nova Scotia. Québec started with the longest stays, and despite a considerable decrease, remained among the longest; stays in British Columbia were among the shortest throughout.

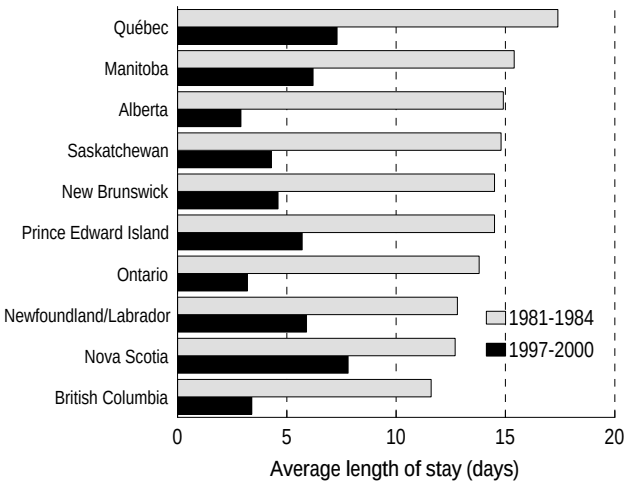
These provincial differences in length of stay may be attributable to variations in hospital procedures and treatment patterns and in the use of outpatient facilities,[13] which can vary not only among provinces, but also among regions within a province,[14] and between urban and rural areas.[15]

Table 2
Average length of stay for breast cancer,† by four-year period, province, stage, comorbidity, procedure and discharge status, Canada, 1981-1984 to 1997-2000

	1981-1984	1985-1988	1989-1992	1993-1996	1997-2000
			Days		
Total	14.5	13.1	10.3	7.5	4.7
Province					
Newfoundland	12.8	12.0	10.5	8.7	5.9
Prince Edward Island	14.5	13.6	12.5	8.7	5.7
Nova Scotia	12.7	12.6	9.1	8.8	7.8
New Brunswick	14.5	12.6	10.0	7.4	4.6
Québec	17.4	15.8	13.4	11.3	7.3
Ontario	13.8	12.2	8.9	5.6	3.2
Manitoba	15.4	14.0	11.3	7.8	6.2
Saskatchewan	14.8	13.2	11.8	7.4	4.3
Alberta	14.9	13.1	8.0	4.5	2.9
British Columbia	11.6	9.8	7.7	5.1	3.4
Cancer stage					
In situ	8.2	6.6	4.8	3.2	2.3
Localized	12.3	10.5	7.8	5.3	3.2
Regional	11.3	10.1	7.7	5.1	3.2
Distant	21.0	21.6	21.4	20.2	16.2
Comorbid conditions (Charlson Index)					
0	13.8	12.4	9.7	7.0	4.4
1-2	22.6	20.9	17.1	12.0	7.2
3+	25.7	23.3	21.8	21.9	10.0
Procedure					
Breast-conserving surgery	7.9	7.2	5.7	3.5	2.2
Mastectomy	11.2	10.0	7.9	5.1	3.3
Other	17.3	18.7	15.6	14.7	12.5
None	23.1	21.1	20.2	19.2	12.7
Discharge status					
Alive	12.0	10.6	8.2	5.7	3.8
Dead	33.5	33.4	29.7	28.7	20.6

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
† Primary diagnosis

Chart 2
Average length of stay for breast cancer,† by province, 1981-1984 and 1997-2000



Data source: Hospital Morbidity Database, 1981/82 to 1984/85 and 1997/98 to 2000/01
† Primary diagnosis

Regardless of age

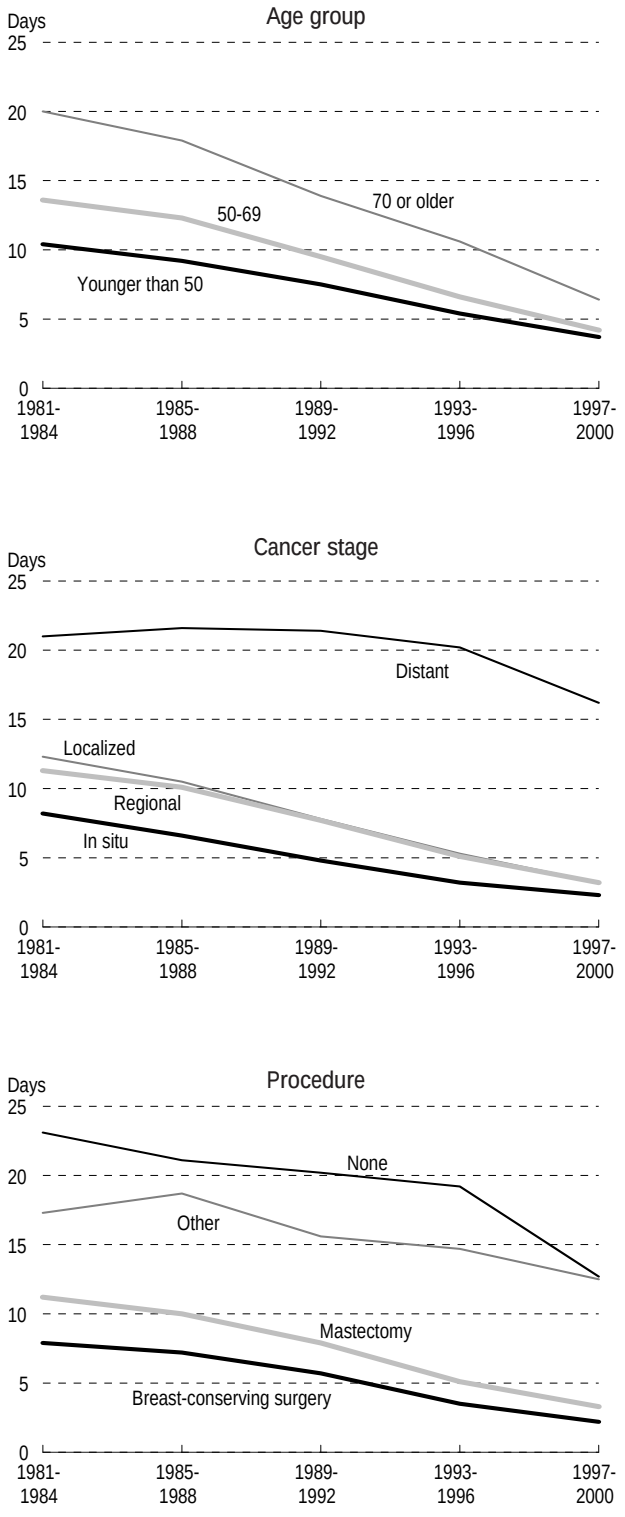
Over the two decades, patients aged 70 or older accounted for 29% of hospital admissions for breast cancer, but made up a considerably larger share—39%—of all hospital days that were attributable to the disease, reflecting the generally much longer stays for elderly women (Appendix Table A). Nonetheless, by 1997-2000, the average stay for breast cancer patients aged 70 or older was strikingly shorter than it had been in 1981-1984, dropping from 20.0 to 6.4 days (Chart 3). Younger women tended not to be hospitalized so long, but average stays for such patients also fell sharply. The average for women aged 50 to 69 fell from 13.6 to 4.2 days, and for women younger than 50, from 10.4 to 3.7 days.

Cancer stage major factor

The time that breast cancer patients spend in hospital is influenced by the stage of the disease; that is, the degree to which it has spread. Yet for all stages, the average length of stay declined.

The three least severe breast cancer stages—in-situ, localized and regional—require the shortest periods of hospitalization and had the most

Chart 3
Average length of stay for breast cancer,† by age group, stage, procedure and period, Canada, 1981-1984 to 1997-2000



Data source: Hospital Morbidity Database, 1981/82 to 2000/01
† Primary diagnosis

substantial decreases in average stays (Chart 3). The average for in-situ breast cancer fell steadily from 8.2 to 2.3 days. The declines for localized and regional cancer were also steady, dropping from around 12 to just over 3 days.

Not surprisingly, hospitalization tends to be longer if a cancer has spread. For distant cancer, the decrease in the average length of stay was smaller and did not begin until the mid-1990s. Before that time, the average had remained more than 20 days, and by 1997-2000, had fallen relatively little to 16.2 days.

Concurrent illness lengthens stay

The time that a breast cancer patient spends in hospital can lengthen if she has other serious conditions, such as heart disease, diabetes, and liver or kidney problems.[6] The presence of such diseases has an impact on the treatment breast cancer patients receive, the success of that treatment, and the time needed for recovery.[16-19] In 1997-2000, breast cancer patients with no other conditions noted in their hospital record averaged 4.4 days, compared with 7.2 days for those with at least one other serious health problem. Both figures, however, were down substantially from the early 1980s, when stays had averaged 13.8 and 22.6 days, respectively.

Procedures

More complicated or extensive procedures generally require more time in hospital. Thus, a woman undergoing a mastectomy might expect to be hospitalized longer than one having breast-conserving surgery (BCS). In the early 1980s, a mastectomy meant an average of 11.2 days in hospital, and BCS, 7.9 days (Chart 3). The pace of decline in length of stay for both procedures was about the same, so that by 1997-2000, stays averaged 3.3 days for mastectomy and 2.2 days for BCS, and the relative difference between them remained almost constant.

Besides a mastectomy or BCS, breast cancer patients may be hospitalized for procedures such as blood transfusions, chemotherapy, nuclear medicine, or diagnostic radiotherapy. (Mastectomy and BCS patients may also have any of these procedures

during the surgical stay.) The average stay for the "other procedure" category decreased, but less sharply than that for mastectomy and BCS, falling from 17.3 to 12.5 days.

Another group of breast cancer patients undergo no procedure while in hospital. And although their average length of stay was almost halved from 23.1 to 12.7 days over the two decades, like the "other procedure" category, it remained high compared with stays involving mastectomy or BCS.

It is clear that the other/no procedure groups consume considerable hospital resources. In 1981-1984, the average stay for the two groups combined was 19.8 days versus 10.3 days for women who had surgery. By 1997-2000, the average stay for the other/no procedure group had fallen by only about a third to 12.6 days, whereas the average for women who had surgery was down by almost three-quarters to 2.7 days (Table 3).

Table 3
Percentage distribution of hospital admissions and days, and average length of stay for breast cancer,† by procedure and selected characteristics, Canada, 1981 to 2000

	Admissions		Days		Average length of stay	
	Other/ No procedure	Surgery	Other/ No procedure	Surgery	Other/ No procedure	Surgery
	%		%		Days	
Total	32.0	68.1	57.6	42.4	18.0	6.2
Period						
1981-1984	44.0	56.0	60.0	40.0	19.8	10.3
1985-1988	39.3	60.7	59.4	40.6	19.9	8.7
1989-1992	32.1	67.9	55.0	45.0	17.7	6.8
1993-1996	25.7	74.3	57.2	42.8	16.7	4.3
1997-2000	19.6	80.4	52.7	47.3	12.6	2.7
Cancer stage						
In situ	9.5	90.5	14.3	85.7	5.8	3.7
Localized	20.0	80.0	37.9	62.1	14.6	6.0
Regional	7.8	91.3	13.9	86.1	11.3	6.7
Distant	92.8	7.2	94.8	5.2	21.0	15.0
Comorbid conditions (Charlson Index)						
0	17.5	82.4	56.0	44.0	16.9	6.0
1-2	13.2	73.1	67.3	32.4	26.6	8.3
3+	53.2	46.8	72.9	27.1	26.6	12.3
Discharge status						
Alive	25.2	74.8	42.4	57.6	13.3	6.1
Dead	98.3	1.7	97.4	2.6	30.0	41.0

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
† Primary diagnosis

The other/no procedure patients are the most serious cases: those who have recurring cancer and are admitted for treatment of metastatic diseases, or have such severe initial disease that surgery is not appropriate. In fact, over the 20 years, the "no procedure" group accounted for 53% of admissions with the most severe comorbid conditions, 93% of admissions for which the diagnosis was distant cancer, and 98% of admissions that ended in an in-hospital death.

The proportion of breast cancer admissions that did not involve surgery fell from 44% in the earliest period to 20% in the most recent. It is likely that such patients are increasingly being cared for in chronic care or palliative care institutions, or prefer to die at home.[20-24] Nonetheless, some breast cancer patients still die in hospital, typically after a long stay. In 1997-2000, the average stay for such patients was 20.6 days—about five times the overall average (Table 2). Although this was down substantially from 33.5 days in 1981-1985, the pace of decline lagged behind that for breast cancer patients in general.

Factors interrelated

The factors that can affect the length of time a breast cancer patient spends in hospital do not exist in isolation. A woman's age may be associated with the stage at which the cancer is diagnosed and with the presence of other conditions, which, in turn, influence the type of treatment she receives. For instance, the likelihood of undergoing BCS rather than a mastectomy depends on disease variables such as tumour size[13] cancer stage,[25] and a variety of socio-economic and demographic factors.[13,14,26-28] Yet even when age, geographic region, cancer stage, comorbid conditions, procedure and period are considered together, the relationship between each of these variables and length of stay persists.

The median stay for breast cancer patients over the entire 20-year period was 5 days. The odds of staying longer than 5 days were significantly high in the earlier periods, compared with 1997-2000 (Table 4). The odds of a long stay also rose with the patient's age and number of comorbid conditions. As well, compared with women who

Table 4
Adjusted odds ratios for hospital stays for breast cancer† longer than median,‡ in relation to selected characteristics, Canada, 1981 to 2000

	Adjusted odds ratio	99% confidence interval
Age group		
Younger than 50§	1.0	...
50-69	1.3*	1.2, 1.3
70 or older	1.9*	1.9, 2.0
Cancer stage		
In situ§	1.0	...
Localized/Regional	2.1*	2.0, 2.3
Distant	6.4*	6.0, 6.8
Comorbid conditions (Charlson Index)		
0§	1.0	...
1-2	1.6*	1.5, 1.6
3+	1.9*	1.7, 2.2
Procedure		
Breast-conserving surgery§	1.0	...
Mastectomy	4.3*	4.2, 4.4
Other	1.3*	1.3, 1.4
None	1.0	1.0, 1.1
Period		
1981-1984	21.4*	20.6,22.2
1985-1988	19.0*	18.3,19.7
1989-1992	10.2*	9.9,10.5
1993-1996	2.9*	2.8, 3.0
1997-2000§	1.0	...
Geographic region		
Atlantic	3.3*	3.1, 3.4
Québec	3.8*	3.6, 3.9
Ontario	1.3*	1.2, 1.3
Prairies	1.5*	1.4, 1.6
British Columbia§	1.0	...
Discharge status		
Alive§	1.0	...
Dead	1.7*	1.6, 1.8

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
† Primary diagnosis
‡ Median length of stay = 5 days
§ Reference group
** Significantly different from reference group (p < 0.01)*

had in situ cancer, the odds of a long stay were high for those with local/regional, and especially, distant, cancer. The odds were high that women who had had mastectomies or "other" procedures would be hospitalized longer than the median, compared with the odds for women who had BCS. By contrast, the odds of a long stay for women who had "no procedure" were not significantly high, perhaps because of redundancy between the variables "no procedure" and "distant."

Cancer stage

Over the entire 20 years, the median length of stay was 3 days for patients with in-situ breast cancer. Their odds of being hospitalized longer than 3 days were more than 20 times greater in the early 1980s than in 1997-2000 (Table 5). For patients with localized or regional breast cancer, the overall median length of stay during the two decades was 5 days. Their odds of a stay that surpassed this median were more than 40 times greater in the early 1980s than in 1997-2000.

The reduction over time in length of stay was much less dramatic for patients with distant cancer. Over the two decades, the median length of stay for such patients was 11 days. At the beginning of

Table 5
Adjusted odds ratios for hospital stays for breast cancer† longer than median,‡ by cancer stage, in relation to selected characteristics, Canada, 1981 to 2000

	Cancer stage		
	In situ	Localized/ Regional	Distant
Period			
1981-1984	23.4*	44.0*	1.8*
1985-1988	17.3*	36.1*	1.7*
1989-1992	11.3*	16.7*	1.5*
1993-1996	3.2*	3.9*	1.3*
1997-2000§	1.0	1.0	1.0
Age group			
Younger than 50§	1.0	1.0	1.0
50-69	1.0	1.3*	1.4*
70 or older	1.3*	1.9*	2.1*
Comorbid conditions (Charlson Index)			
0§	1.0	1.0	1.0
1-2	1.4*	1.6*	1.2*
3+	1.8*	2.7*	0.7*
Procedure			
Breast-conserving surgery§	1.0	1.0	1.0
Mastectomy	7.2*	4.7*	0.9
Other	0.9	0.9	1.7*
None	1.8*	1.3*	0.8
Discharge status			
Alive§	1.0	1.0	1.0
Dead	5.2*	2.8*	1.7*
Median length of stay (days)	3	5	11

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
Note: Logistic regression models are adjusted for all variables shown and for region of residence.
† Primary diagnosis
‡ Length of stay dichotomized at median
§ Reference group
** Significantly different from reference group (p < 0.01)*

the period, their odds of being hospitalized longer than this median were just under two times their odds at the end of the period. This illustrates that even in an era of steep reductions in length of stay, patients with distant cancer continue to be hospitalized for a relatively long time.

When the data are stratified by time period and patients' age, again, distant cancer stands out: the odds that these patients would have a relatively long hospital stay actually rose over time, regardless of their age (Table 6). For instance, in 1981-1988, the median length of stay for breast cancer patients aged 70 or older was 10 days. Those with distant cancer had about three times the odds of a hospital stay that exceeded this median, compared with those in the same age group who had in-situ cancer. By 1997-2000, the median stay for elderly women with breast cancer was 3 days; the odds that those with distant cancer would remain in hospital longer than this median were almost nine times the odds for their contemporaries with in-situ tumours.

Impact of shorter stays

The steady reductions in hospital stays over the past two decades may raise concern about the effects of "early" discharge on breast cancer patients.

Definitions

For this analysis, breast cancer is classified in accordance with the *International Classification of Diseases, Ninth Revision* (ICD-9).[3] Diagnostic codes recorded on discharge summaries were used to identify breast cancer admissions and classify them by *cancer stage*: in-situ, localized, regional and distant. In-situ carcinoma of the breast (ICD-9 code 233.0), which means cancer in place, is an early cancer that has not spread beyond its point of origin. Localized breast cancer (174.0 to 174.9) has spread into the breast; regional (174.0 to 174.9 plus 196.0 to 196.9), into the breast and also the lymph nodes. Distant cancer (174.0 to 174.9 plus 197 to 199.0) is primary malignant breast cancer with metastases beyond the lymph nodes or any other secondary or unspecified neoplasms.

Diagnoses were obtained from the first five diagnostic fields on the patient's chart. The primary diagnosis appears in the first field. Only cases with breast cancer recorded as the primary diagnosis were included in this analysis. If there was more than one breast cancer diagnosis, the most severe was used to determine stage.

The two in-hospital procedures most frequently performed for breast cancer are breast-conserving surgery (BCS), also known as lumpectomy or wide local excision,[29] and mastectomy. BCS is removal of the tumour along with an area of normal tissue; for a mastectomy, most of the breast tissue is removed.[29] Breast surgeries were coded in accordance with the *Canadian Classification of Diagnostic and Therapeutic Procedures* (CCP).[30] Mastectomies were identified as CCP codes 97.12 to 97, and BCS as codes 97.11 and 97.25 to 97.28. Various other types of breast tissue removal and axillary node excision were identified as codes 52.13 and 52.43.

For this study, all *procedures* from the first six recorded procedure fields were checked. If both mastectomy and BCS were listed as having been performed during a single admission, the most severe (mastectomy) was selected for determining length of stay. This was the case for about 3% of admissions. "Other procedures" refers to non-operative procedures such blood transfusions, chemotherapy, nuclear medicine, and diagnostic radiotherapy. The "no procedure" category pertains to hospitalizations for which breast cancer was the primary diagnosis, but no procedures were performed.

Length of stay was defined as the number of days in hospital from the admission date (set at 0) to the discharge date. Since a small proportion of hospital stays were very long, sometimes several years, length of stay was capped at 365 days. The calculation of total days in hospital also included this truncation.

Comorbid conditions are measured with the Charlson Index, which categorizes ICD diagnostic codes according to severity and assigns a value.[6] Metastatic tumours are considered distant cancer, and are not included among the comorbidities.

For most provinces, *age* was calculated by subtracting date of birth from admission date. (Québec and Manitoba submit a reporting date.) Three age groups were defined for analysis: younger than 50, 50 to 69, and 70 or older.

Discharge status refers to whether the patient died in hospital.

Province of residence was used to allocate patients to provinces. Because of small populations in some provinces, the provinces were grouped into five regions for multivariate analysis: Atlantic (Newfoundland and Labrador, Prince Edward Island, Nova Scotia, and New Brunswick); Québec; Ontario; Prairies (Manitoba, Saskatchewan and Alberta); and British Columbia. The territories are included in the national data, but no data are presented at the territorial level.

Table 6
Adjusted odds ratios for hospital stays for breast cancer† longer than median,‡ by age group and period, in relation to selected characteristics, Canada, 1981-1988 to 1997-2000

		Age group								
		Younger than 50			50-69			70 or older		
	Total	1981-1988	1989-1996	1997-2000	1981-1984	1989-1998	1997-2000	1981-1988	1989-1996	1997-2000
Cancer stage										
In situ§	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Localized/Regional	2.1*	2.1*	1.9*	1.5*	2.3*	2.4*	1.8*	1.9*	2.3*	2.1*
Distant	6.4*	5.5*	4.6*	7.2*	5.2*	8.1*	10.2*	3.4*	5.9*	8.7*
Comorbid conditions (Charlson Index)										
0§	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1-2	1.5*	1.6*	1.2	1.4*	1.7*	1.5*	1.5*	1.6*	1.6*	1.5*
3+	1.9	1.2	2.0	1.5	1.9*	1.6*	1.8*	2.0*	2.0*	1.8*
Procedure										
Breast-conserving surgery§	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Mastectomy	4.3*	5.3*	3.0*	3.2*	4.7*	3.2*	3.2*	3.7*	3.6*	3.2*
Other	1.3*	1.1	1.2*	1.6*	1.8*	1.4*	1.4*	3.3*	2.5*	3.3*
None	1.0	0.7	1.0	1.2	1.1	1.3*	1.3*	2.5*	2.4*	3.1*
Discharge status										
Alive§	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Dead	1.7*	1.8*	1.3*	1.4	1.6*	1.5*	1.7*	1.8*	1.6*	1.7*
Median length of stay (days)	5	7	4	2	8	5	2	10	6	3

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
Note: Logistic regression models are adjusted for all variables shown and for region of residence.
† Primary diagnosis
‡ Length of stay dichotomized at median
§ Reference group
** $p < 0.01$*

However, other research has generally not found shorter stays to be associated with less favourable outcomes. In 1989, a comparison of three groups of mastectomy patients with different lengths of stay found no differences in surgical complications.[31] Subsequent studies in the 1990s showed no increase in the rate of complications or long-term sequelae.[32-34] As well, according to a report from the Organisation for Economic Co-operation and Development, breast cancer treatment patterns and outcomes for Canada compare favourably with those of other OECD countries.[35]

One indication of a potentially negative outcome is the proportion of women who are readmitted to hospital shortly after undergoing a procedure for breast cancer. National data that make it possible to track individual patients are available only from 1994 . As well, based on the limited information on patients' records, it is not possible to determine if these readmissions resulted from complications or if further treatment had been planned. Nonetheless, relatively few BCS and mastectomy patients were rehospitalized for cancer-related reasons in the two months following discharge. In 1994, 13.2% of women who had BCS were readmitted within 60 days; in 2000, the figure was 11.1% (Table 7). The proportion of mastectomy patients rehospitalized within 60 days was 4.7% in 1994 and 3.9% in 2000.

It is possible that the sharp reduction in length of stay for breast cancer could affect patient satisfaction. However, patients often prefer short stays.[34] The physical and psychological benefits of a relatively brief hospitalization tend to outweigh the minor inconvenience to the patients and their families.[36] Even in the case of terminal illness, research suggests that patients prefer to die at home.[20]

Of course, the ultimate measure of success in treating breast cancer is survival. Population-based survival estimates are useful "average" outcome

Table 7
Percentage of BCS and mastectomy patients rehospitalized within 60 days, Canada, 1994 and 2000

		Total readmissions		Procedure on readmission within 60 days							
				Breast-conserving surgery		Mastectomy		Lymph node excision		Aftercare	
	Total patients	Number	% of total patients	Number	% of total patients	Number	% of total patients	Number	% of total patients	Number	% of total patients
Total											
1994	12,877	1,194	9.3	169	1.3	485	3.8	146	1.1	394	3.1
2000	13,830	1,050	7.6	103	0.7	440	3.2	91	0.7	416	3.0
Breast-conserving surgery (BCS)											
1994	6,961	918	13.2	166	2.4	447	6.4	136	2.0	169	2.4
2000	7,079	784	11.1	98	1.4	411	5.8	75	1.1	200	2.8
Mastectomy											
1994	5,916	276	4.7	3	0.1	38	0.6	10	0.2	225	3.8
2000	6,785	266	3.9	5	0.1	29	0.4	16	0.2	216	3.2

Data source: Health Person-Oriented Information Database, 1994/95 and 2000/01

indicators of the effectiveness of cancer diagnosis and treatment. A recent study that compared five-year survival ratios for breast cancers diagnosed in 1985-1987 with those diagnosed in 1992-1994 found that survival increased for all age groups in all provinces.[37] And reflecting those increases in relative survival, breast cancer mortality rates have fallen: from 30.1 deaths per 100,000 women in 1981 to 25.0 per 100,000 in 2001.[38]

Concluding remarks

In Canada, as in other OECD countries,[36] the length of time that breast cancer patients spend in hospital has declined sharply since the early 1980s. The average fell from more than 14 days in 1981-1984 to less than 5 days in 1997-2000. Moreover, regardless of the patient's age, province of residence, stage of the cancer, comorbid conditions, and procedures that were (or were not) performed, average length of stay dropped. Substantial decreases occurred for in-situ, localized and regional disease, and smaller decreases, for the more complex cases—notably distant cancer.

The decline in length of stay cannot be attributed to any single cause. Length of stay results from an interplay of a number of factors, among them, a trend toward less extensive operations,[39-41] particularly a shift away from radical mastectomies toward BCS.[42] Another change is the use of adjuvant therapy for cases with axillary lymph node involvement (that is, the cancer cells have spread outside the breast to lymph nodes in the underarm area).[42]

This analysis of hospital data was able to examine variables such as the patients' age, disease severity, and comorbid conditions. Characteristics such as socio-economic status, which are also important, could not be included because they are not compiled in the Hospital Morbidity Database.

No attempt is made here to identify an "ideal" length of stay for breast cancer patients. However, according to a number of indicators, shorter hospital stays did not compromise outcomes. The decline has not meant higher readmission rates, reduced survival or higher mortality rates. In fact, breast cancer mortality rates have dropped, survival ratios have increased, and readmission rates are low and stable.

Nonetheless, substantial numbers of breast cancer patients still have very long hospital stays, notably those with distant cancer. This may be an area of hospital use amenable to further reductions in length of stay. It is possible that many of these patients could be treated in more suitable chronic care or palliative care institutions, or even sent home, if appropriate facilities and home care were available. ●

References

1 National Cancer Institute of Canada. *Canadian Cancer Statistics, 2003*. Toronto: The National Cancer Institute of Canada, 2003.

2 Will BP, Berthelot JM, Nobrega KM, et al. Canada's Population Health Model (POHEM): a tool for performing economic evaluations of cancer control interventions. *European Journal of Cancer* 2001; 37(14): 1797-804.

3 World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries and Death*. Based on the recommendations of the Ninth Revision Conference, 1975. Geneva: World Health Organization, 1977.

4 Tartter PI, Beck G, Fuchs K. Determinants of hospital stay after modified radical mastectomy. *American Journal of Surgery* 1994; 168(4): 320-4.

5 Elixhauser A, Steiner C, Harris DR, et al. Comorbidity measures for use with administrative data. *Medical Care* 1998; 36(1): 8-27.

6 Charlson ME, Pompei P, Ales KL, et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *Journal of Chronic Diseases* 1987; 40(5): 373-83.

7 D'Hoore W, Sicotte C, Tilquin C. Risk adjustment in outcome assessment: the Charlson comorbidity index. *Methods of Information in Medicine* 1993; 32(5): 382-7.

8 Ghali WA, Hall RE, Rosen AK, et al. Searching for an improved clinical comorbidity index for use with ICD-9-CM administrative data. *Journal of Clinical Epidemiology* 1996; 49(3): 273-8.

9 Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *Journal of Clinical Epidemiology* 1992; 45(6): 613-9.

10 Gaudette LA, Gao R-N, Spence A, et al. Declining use of mastectomy for invasive breast cancer in Canada, 1981-2000. *Canadian Journal of Public Health* 2004. (in press)

11 Warren JL, Riley GF, Potosky AL, et al. Trends and outcomes of outpatient mastectomy in elderly women. *Journal of the National Cancer Institute* 1998; 90(11): 833-40.

12 Brownell MD, Roos NP. Varation in length of stay as a measure of efficiency in Manitoba hospitals. *Canadian Medical Association Journal* 1995; 152: 675-82.

13 Goel V, Olivotto I, Hislop TG, et al. Patterns of initial management of node-negative breast cancer in two Canadian provinces. *Canadian Medical Association Journal* 1997; 156(1): 25-35.

14 Iscoe NA, Goel V, Wu K, et al. Variation in breast cancer surgery in Ontario. *Canadian Medical Association Journal* 1994; 150(3): 345-52.

15 Lee AH, Codde J. Determinants of length of stay: implications on differential funding for rural and metropolitan hospitals. *Australian Health Review* 2000; 23(4): 126-33.

16 Librero J, Peiro S, Ordinana R. Chronic comorbidity and outcomes of hospital care: length of stay, mortality, and readmission at 30 and 365 days. *Journal of Clinical Epidemiology* 1999; 52(3): 171-9.

17 Brooks SE, Ahn J, Mullins CD, et al. Health care cost and utilization project analysis of comorbid illness and complications for patients undergoing hysterectomy for endometrial carcinoma. *Cancer* 2001; 92(4): 950-8.

18 Newschaffer CJ, Penberthy L, Desch CE, et al. The effect of age and comorbidity in the treatment of elderly women with nonmetastatic breast cancer. *Archives of Internal Medicine* 1996; 156(1): 85-90.

19 D'Hoore W, Bouckaert A, Tilquin C. Practical considerations on the use of the Charlson comorbidity index with administrative data bases. *Journal of Clinical Epidemiology* 1996; 49(12): 1429-33.

20 Burge F, Lawson B, Johnston G. Trends in the place of death of cancer patients, 1992-1997. *Canadian Medical Association Journal* 2003; 168(3): 265-70.

21 Higginson IJ, Astin P, Dolan S. Where do cancer patients die? Ten-year trends in the place of death of cancer patients in England. *Palliative Medicine* 1998; 12(5): 353-63.

22 Hunt R, Bonett A, Roder D. Trends in the terminal care of cancer patients: South Australia, 1981- 1990. *Australian and New Zealand Journal of Medicine* 1993; 23(3): 245-51.

23 Cantwell P, Turco S, Brenneis C, et al. Predictors of home death in palliative care cancer patients. *Journal of Palliative Care* 2000; 16(1): 23-8.

24 Bruera E, Russell N, Sweeney C, et al. Place of death and its predictors for local patients registered at a comprehensive cancer center. *Journal of Clinical Oncology* 2002; 20(8): 2127-33.

25 Ballard-Barbash R, Potosky AL, Harlan LC, et al. Factors associated with surgical and radiation therapy for early stage breast cancer in older women. *Journal of the National Cancer Institute* 1996; 88(11): 716-26.

26 Barlow WE, Taplin SH, Yoshida CK, et al. Cost comparison of mastectomy versus breast-conserving therapy for early-stage breast cancer. *Journal of the National Cancer Institute* 2001; 93(6): 447-55.

27 Desch CE, Penberthy LT, Hillner BE, et al. A sociodemographic and economic comparison of breast reconstruction, mastectomy, and conservative surgery. *Surgery* 1999; 125(4): 441-7.

28 Adelson P, Lim K, Churches T, et al. Surgical treatment of breast cancer in New South Wales 1991, 1992. *Australian and New Zealand Journal of Medicine* 1997; 67(1): 9-14.

29 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). *Canadian Medical Association Journal* 2002; 167(2): 154-5.

30 Statistics Canada. *Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures* (Statistics Canada, Catalogue 82-562E) Ottawa: Statistics Canada, 1986.

31 Wagman LD, Terz JJ, Hill LR, et al. Evaluation of a short-stay program for patients undergoing mastectomy. *Journal of Surgical Oncology* 1989; 41(2): 98-102.

32 Clark JA, Kent RB 3rd. One-day hospitalization following modified radical mastectomy. *The American Surgeon* 1992; 58(4): 239-42.

33 Boman L, Bjorvell H, Cedermark B, et al. Effects of early discharge from hospital after surgery for primary breast cancer. *European Journal of Surgery* 1993; 159(2): 67-73.

34 Burke CC, Zabka CL, McCarver KJ, et al. Patient satisfaction with 23-hour "short-stay" observation following breast cancer surgery. *Oncology Nursing Forum* 1997; 24(4): 645-51.

35 Hughes M, Jacobzone S. *Cross-national Differences in the Treatment, Costs and Outcomes of Breast Cancer. Disease-based Comparison of Health Systems—What is Best and at What Cost?* Paris, France: Organisation for Economic Cooperation and Development, 2003.

36 Kambouris A. Physical, psychological, and economic advantages of accelerated discharge after surgical treatment for breast cancer. *The American Surgeon* 1996; 62(2): 123-7.

37 Ellison LF, Gibbons L. Leading cancers—changes in five-year survival. *Health Reports* (Statistics Canada, Catalogue 82-003) 2004; 15(2): 19-32.

38 National Cancer Institute of Canada. *Canadian Cancer Statistics, 2004*. Toronto: The National Cancer Institute of Canada, 2004.

39 Lindqvist R, Moller TR, Stenbeck M, et al. Do changes in surgical procedures for breast cancer have consequences for hospital mean length of stay? A study of women operated on for breast cancer in Sweden, 1980-95. *International Journal of Technology Assessment in Health Care* 2002; 18(3): 566-75.

40 Kleinman JC, Machlin SR, Madans J, et al. Changing practice in the surgical treatment of breast cancer. The national perspective. *Medical Care* 1983; 21(12): 1232-42.

41 Hébert-Croteau N, Brisson J, Latreille J, et al. Variations in the treatment of early-stage breast cancer in Quebec between 1988 and 1994. *Canadian Medical Association Journal* 1999; 161(8): 951-5.

42 Consensus Conference. Treatment of early stage breast cancer. National Institutes of Health. *Connecticut Medicine* 1991; 55(2): 101-7.

Appendix

Table A
Hospital admissions, length of stay per visit, and hospital days for breast cancer, by selected characteristics, Canada, 1981 to 2000

			Length of stay†	
	Admissions	Days	Average	Median
Total 1981-2000 (number)	388,146	3,865,730	Days	
	%	%		
	100.0	100.0	10.0	5
Age				
Younger than 50	24.1	17.3	7.1	5
50-69	47.2	43.8	9.3	5
70 or older	28.7	38.9	13.5	6
Cancer stage				
In situ	3.5	1.3	3.9	3
Localized	59.2	45.6	7.7	5
Regional	17.6	12.5	7.1	5
Distant	19.7	40.5	20.5	11
Comorbid conditions (Charlson Index)				
0	91.4	86.3	9.4	5
1-2	7.8	12.0	15.4	7
3+	0.8	1.6	20.2	9
Procedure				
Breast-conserving surgery	30.2	14.2	4.7	3
Mastectomy	37.9	28.2	7.4	6
Other	17.4	28.4	16.3	8
None	14.6	29.3	20.0	8
Period				
1981-1984	18.2	26.0	14.5	9
1985-1988	20.2	26.0	13.1	8
1989-1992	21.5	22.3	10.3	6
1993-1996	20.1	15.1	7.5	4
1997-2000	20.0	9.4	4.7	2
Province				
Newfoundland	1.5	1.4	9.7	7
Prince Edward Island	0.6	3.0	10.8	7
Nova Scotia	3.5	0.6	10.2	7
New Brunswick	2.7	3.3	9.5	6
Québec	26.9	34.5	12.8	7
Ontario	37.0	32.3	9.0	5
Manitoba	3.9	4.3	10.8	6
Saskatchewan	4.0	4.1	10.3	6
Alberta	7.5	6.3	8.3	4
British Columbia	12.4	9.2	7.4	4
Discharge status				
Alive	90.9	72.3	7.9	5
Dead	9.1	27.7	30.3	14

Data source: Hospital Morbidity Database, 1981/82 to 2000/01
Note: Because of rounding, detail may not add to totals.
† Length of stay truncated at 365 days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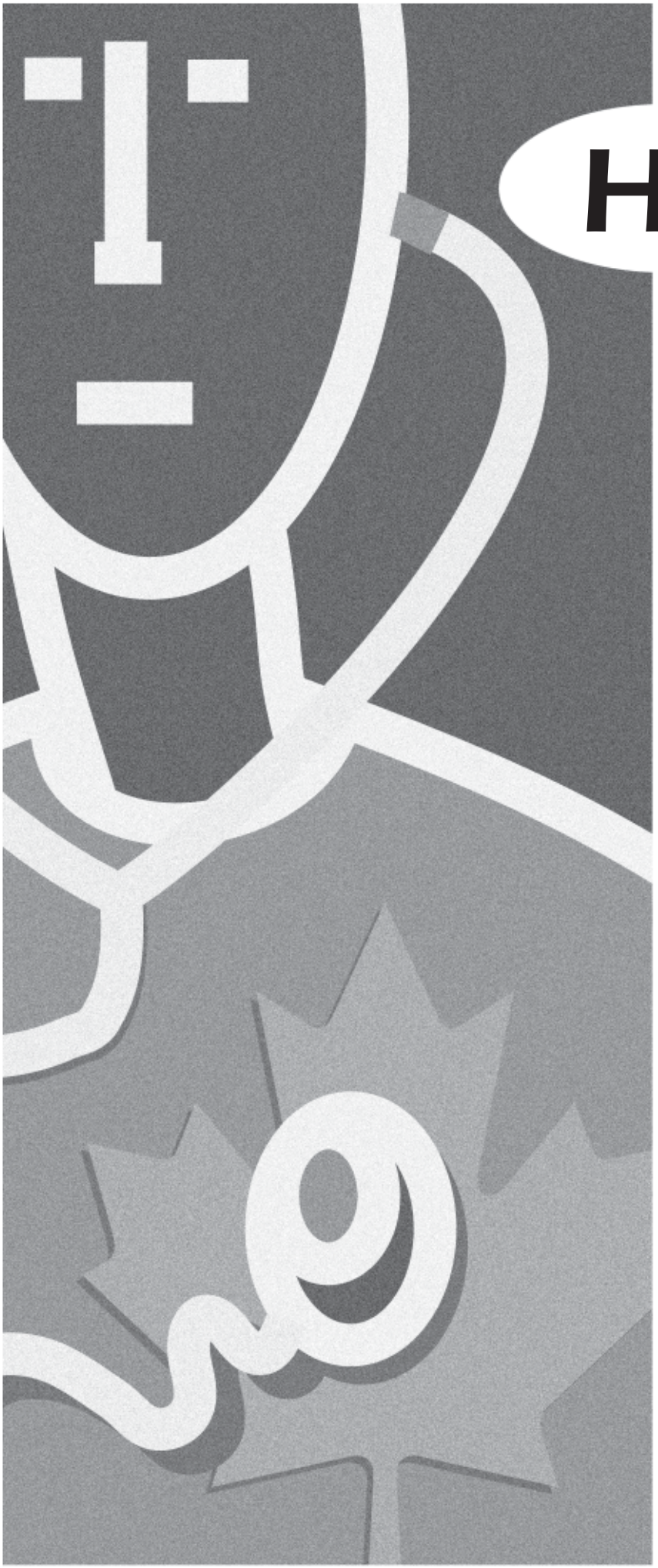

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USE OF HOSPITAL EMERGENCY ROOMS

by Gisèle Carrière

About one in eight Canadians aged 15 or older—an estimated 3.3 million—reported in 2003 that their most recent contact with a health professional or treatment for their most serious activity-limiting injury occurred in a hospital emergency room (ER) (Table A). Rates of ER use were highest among teenagers and young adults, reflecting the elevated risk of serious injury at these ages.[1] Similarly, at least in Ontario, administrative records for the year 2000 showed that trauma represented the largest proportion of all ER visits.[2]

Estimates from the 2003 Canadian Community Health Survey show that men were slightly more likely than women to have used ER services: 14% versus 12%. Among men, the most likely to have sought help in an ER were 15- to 24-year-olds (20%). For women, the proportion of ER users peaked at 18% in the 15-to-17 age group, followed closely by 17% for those aged 18 to 24. Beyond these ages, ER use for both sexes declined, falling to 11% for seniors.

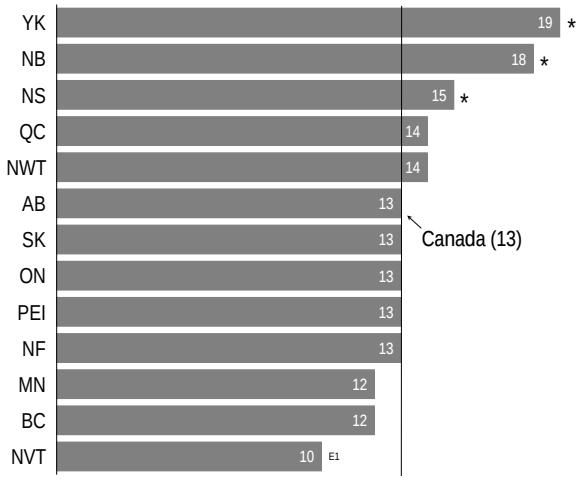
ER use is inversely associated with household income. While 18% of people in the lowest income group had received their most recent treatment in an ER, the figure for those in the highest income group was 13%.

Percentage of people reporting at least one emergency room visit

	Both sexes	Men	Women
	%	%	%
All ages	13	14*	12
15 to 17	19*	20*	18*
18 to 24	18*	20*	17*
25 to 44	14	16*	11
45 to 64	11*	11*	10*
65 or older	11*	11*	11

Data source: 2003 Canadian Community Health Survey
** For all ages, significantly different from estimate for women; for age groups within each sex, significantly different from total for that sex (both p < 0.05).*

The provinces/territories—percentage of people reporting at least one emergency room visit



Data source: 2003 Canadian Community Health Survey
** Significantly different from estimate for Canada (p < 0.05)*
E1 Coefficient of variation between 16.6% and 25.0%

Across the country

Generally, ER use was similar in the provinces and territories. Notable exceptions were New Brunswick, Nova Scotia and Yukon, where the proportions of people using an ER were significantly higher than for Canada as a whole. Across the country, residents of rural areas were more likely than urban dwellers to have used an ER: 15% versus 13% (data not shown).

Poor health, injury linked to use

As might be expected, among people who sustained a serious injury, the proportion who used ER services was high at 44%. As well, relatively high proportions of people who reported fair or poor health or at least one chronic condition used ER services: 17% and 14%, respectively. And a substantial percentage (18%) of people who reported that they had consulted a mental health

professional had accessed an ER; in particular, those with mood (20%) or anxiety disorders (19%).

Percentage of people with selected health conditions using emergency rooms†

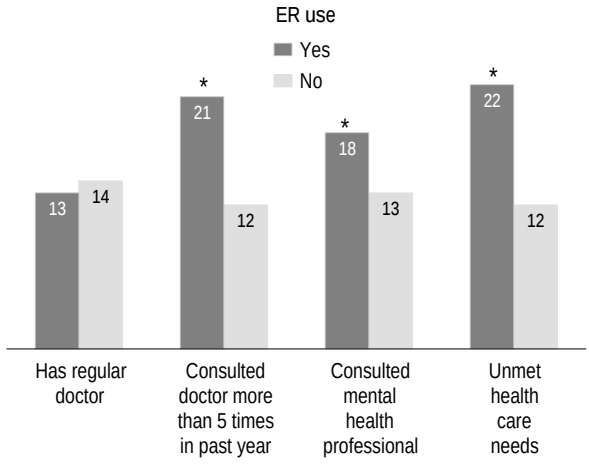
	%		%
Activity-limiting injury in past year		Arthritis/Rheumatism	
Yes	44*	Yes	13
No‡	8	No‡	13
Self-perceived health		Chronic bronchitis	
Excellent/Very good	12*	Yes	19*
Good	13*	No‡	13
Fair/Poor‡	17	Chronic obstructive pulmonary disease	
At least one chronic condition		Yes	21*
Yes	14*	No‡	11
No‡	11	Heart disease	
Diabetes		Yes	16*
Yes	13	No‡	13
No‡	13	Stroke	
Asthma		Yes	21*
Yes	18*	No‡	13
No‡	13	Mood disorder	
Self-medicated asthma		Yes	20*
Yes	18	No‡	13
No‡	19	Anxiety disorder	
Fibromyalgia		Yes	19*
Yes	16	No‡	13
No‡	13		

Data source: 2003 Canadian Community Health Survey
† At least once in past year
‡ Reference category
** Significantly different from estimate for reference category (p < 0.05)*

Heavy users of medical care

People who reported having a "regular doctor" were just as likely to report ER use as those who said they did not have a "regular" physician. However, those who had consulted a doctor more than five times in the past year were more likely to report use of an ER than were people who went to the doctor less frequently: 21% versus 12%. Consistent with what others have found,[3] this suggests that ER users are heavy users of other medical services, perhaps reflecting their need for ongoing care related to the health problem or injury that brought them to the ER.

Percentage of people reporting emergency room visit, by use of other health care services/unmet needs



Data source: 2003 Canadian Community Health Survey
** Significantly different from those who responded "no" to the category (p < 0.05)*

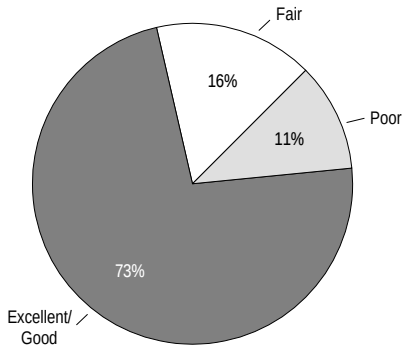
Most ER patients satisfied

Of the 2.4 million people whose most recent hospital visit had been in an ER, just under three-quarters (73%) reported receiving excellent or good care. Another 16% felt their care was fair; 11%, poor. Although most people (71%) were satisfied with ER services, one-fifth (20%) said that they were "somewhat" or "very dissatisfied" with "the way services were provided." No significant differences in the likelihood of dissatisfaction emerged across income levels or age groups, between the sexes, or by the presence of a chronic condition. However, those who consulted physicians more frequently were more likely to be dissatisfied with the ER service received. Predictably, people who reported unmet health care needs were also much more likely than those with no unmet needs to be dissatisfied.

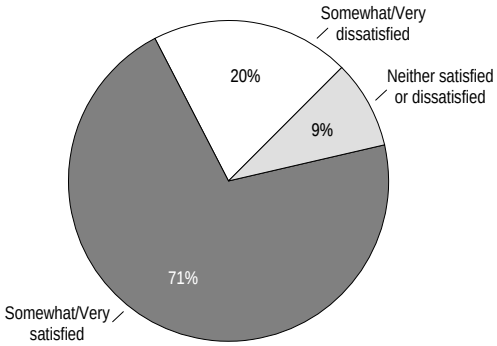
It is possible that dissatisfaction with service may be related to over-crowding, waiting times or lack of understanding for the way hospitals prioritize treatment; however, such information is not available from the CCHS.

Perceived quality of care and satisfaction with service for most recent emergency room visit in past year

Perceived quality of care



Satisfaction with way services provided



Data source: 2003 Canadian Community Health Survey

Dissatisfaction varied by province

Striking differences in the proportions of residents reporting dissatisfaction with their most recent hospital ER service emerged among the provinces and territories. Relative to the rate of 20% for Canadians overall, statistically significant lower rates of dissatisfaction were reported by residents of Québec and Yukon. In Ontario, 24% of residents reported dissatisfaction with ER services, much higher than the national rate.

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Percentage of emergency room users who reported being somewhat to very dissatisfied with service

	%		%
Both sexes	20	Education‡	
Men	19	Less than high school graduation	21
Women†	22	High school graduation	17
Age group‡		Some postsecondary	21 E1
15-17	16 E1	Postsecondary graduation	20
18-24	25	Household income‡	
25-44	21	Lowest	18 E2
45-64	19	Lower-middle	15 E1
65+	15 E1	Middle	23
Province/Territory‡		Upper-middle	18
Newfoundland and Labrador	28 E1	Highest	20
Prince Edward Island	18 E1	Has regular doctor	
Nova Scotia	25	Yes	20
New Brunswick	18	No†	23
Québec	15*	Consultations with doctor in past year	
Ontario	24*	More than 5†	25*
Manitoba	16 E1	5 or fewer	18
Saskatchewan	16 E1	Chronic conditions	
Alberta	24	At least one	21
British Columbia	17	None†	19
Yukon	11 *E2	Unmet health care needs	
Northwest Territories	18 E2	Yes	35*
Nunavut	F	No†	16
Residence			
Urban	22*		
Rural†	15		

Data source: 2003 Canadian Community Health Survey
† Reference category
‡ Reference category = national figure for both sexes
** Significantly different from estimate for reference category (p < 0.05)*
E1 Coefficient of variation between 16.6% and 25.0%
E2 Coefficient of variation between 25.1% and 33.3%
F Coefficient of variation greater than 33.3%

Data source

Information on emergency room use is from cycle 2.1 (2003) of the Canadian Community Health Survey (CCHS).[4] The CCHS is a general health survey that covers the population aged 12 or older living in private households. It does not include residents of Indian reserves, Canadian Forces bases, and some remote areas. The overall response rate for cycle 2.1 was 80.6%; the total sample size was 135,573.

This analysis is based on a sample of 42,693 respondents aged 15 or older who answered questions about their use of hospital emergency rooms in the past 12 months.

Variance on estimates and on differences between estimates was calculated using the bootstrap technique, which accounts for the complex sampling design of the survey.[5,6] Statistical significance was set at $p < 0.05$.

The Questions

Respondents to the Canadian Community Health Survey (CCHS) were asked about their most recent hospital visit, the place of most recent contact with doctors or nurses, and the location of treatment for their most serious injury.

To determine *ER use*, responses to the following questions were used: "Not counting when you were an overnight patient, in the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with: a family doctor or general practitioner? an eye specialist (such as an ophthalmologist or optometrist)? any other medical doctor (such as a surgeon, allergist, orthopedist, gynecologist or psychiatrist)?" Responses to these three items were used to establish if a respondent had *consulted a doctor more than 5 times in the past 12 months*, and respondents were also asked where these most recent contacts with doctors or nurses took place. If the reply was "hospital," the interviewer probed to clarify if that meant as an inpatient, outpatient or as a *patient of a hospital emergency room*. Because respondents were asked only about their *most recent* hospital visit and *most serious* injury, it is likely that these data underestimate ER use and should not be interpreted as representing the total number of visits to hospital ERs.

Other health service use was measured by asking respondents if they had a *regular doctor*, and if they had *consulted a mental health professional in the past year*.

Respondents were asked about *injuries* other than repetitive strain that had "occurred in the past 12 months, and were serious enough to limit your normal activities, for example, a broken bone, a bad cut or burn, a sprain, or poisoning." They were also asked where they were injured, if they had received medical attention within 48 hours and, if so, where they had been treated; *hospital emergency room* was among the possible responses.

The CCHS also asked: "In the past 12 months, have you received any health care services at a hospital, either as an inpatient, an outpatient or an emergency room patient?" Respondents who said "yes" were asked if they had been an inpatient, outpatient, or an *emergency room patient*.

Patient satisfaction was measured by asking respondents to think of their most recent hospital visit and rate the quality of health care as excellent, good, fair or poor. They were also asked about their satisfaction with the way hospital services were provided: very satisfied; somewhat satisfied; neither satisfied nor dissatisfied; somewhat dissatisfied; and very dissatisfied. As these questions measure only patients' perceptions, the responses should not be used to assess the medical advice given or care received.

The following question was used to determine *unmet health care needs*: "During the past 12 months, was there ever a time when you felt that you needed health care but you didn't receive it?"

References

1 Wilkins K. Injuries. *Health Reports* (Statistics Canada, Catalogue 82-003) 2004; 15(3): 43-8.

2 Chan BTB, Schull MJ, Shultz SE. Atlas Report: Emergency department services in Ontario, 1993-2000. November 2001, Institute for Clinical Evaluative Studies. Available at *http://www.ices.on.ca*. Accessed June 20, 2003.

3 Chan BTB, Ovens HJ. Frequent users of emergency departments. Do they also use family physician services? *Canadian Family Physician* 2002; 48: 1654-60.

4 Béland Y. Canadian Community Health Survey—methodological overview. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; 13(3): 9-14.

5 Rao JNK, Wu CFJ, Yue K. Some recent work on resampling methods for complex surveys. *Survey Methodology* (Statistics Canada, Catalogue 12-001) 1992; 18(2): 209-17.

6 Rust KF, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5: 281-310.

Table A

Percentage of people reporting at least one emergency room visit in past year, by sex and selected characteristics, household population aged 15 or older, Canada, 2003

	Both sexes		Men		Women	
	'000	%	'000	%	'000	%
Total	3,300	13	1,796	14*	1,503	12
Age group, overall†	3,300	13	1,796	14	1,503	12
15-17	266	19*	142	20*	123	18*
18-24	510	18*	284	20*	226	17*
25-44	1,286	14	763	16*	523	11
45-64	828	11*	429	11*	399	10*
65 or older	410	11*	177	11*	233	11
Canada†	3,300	13	1,796	14	1,503	12
Newfoundland and Labrador	59	13	33	15	26	12
Prince Edward Island	14	13	6	12	8	14
Nova Scotia	108	15*	55	16	53	14*
New Brunswick	106	18*	57	20*	49	16*
Québec	833	14	423	14	410	13*
Ontario	1,232	13	702	15	529	11*
Manitoba	104	12	52	12	51	12
Saskatchewan	100	13	55	15	45	12
Alberta	325	13	182	15	143	12
British Columbia	409	12	225	14	184	11
Yukon	4	19*	2	20*	2[E1]	18[E1]*
Northwest Territories	4	14	2	14	2[E1]	13 [E1]
Nunavut	1[E1]	10[E1]	1[E2]	11[E2]	1[E2]	10 [E2]
Education†	3,246	13	1,767	15	1,479	12
Less than high school graduation	823	15*	465	17*	358	13
High school graduation	607	13	322	15	286	11
Some postsecondary	308	15	162	16	147	14
Postsecondary graduation	1,507	12*	819	13*	689	11
Household income†	2,767	13	1,531	14	1,236	12
Lowest	94	18*	49[E1]	23[E1]*	45	14
Lower-middle	188	15	75[E1]	16	113	15*
Middle	562	14	269	15	293	13
Upper-middle	929	13	516	14	413	11
Highest	994	13	622	14	372	11
Has regular doctor						
Yes	2,807	13	1,473	14	1,334	12
No†	491	14	322	15	168	13
Consultations with doctor in past year						
5 or fewer	2,468	12*	1,431	13*	1,037	10*
More than 5†	824	21	361	24	463	20
Chronic conditions						
At least one	2,518	14*	1,273	16*	1,246	13*
None†	778	11	523	12	255	8
Unmet health care needs						
Yes	670	22*	304	23*	366	21*
No†	2,626	12	1,490	13	1,135	10

Data source: 2003 Canadian Community Health Survey
† Reference category
** Significantly different ($p < 0.05$) from value in reference category; for total row, estimate for men is significantly higher than that for women*
E1 Coefficient of variation between 16.6% and 25.0%
E2 Coefficient of variation between 25.0% and 33.0%


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DENTAL CONSULTATIONS

by Wayne J. Millar

According to the 2003 Canadian Community Health Survey (CCHS), 63% of people aged 15 or older had consulted a dentist in the previous year (Table A), up from the 47% estimated in the 1978/79 Canada Health Survey. Factors such as the introduction of fluoride toothpaste and fluoridated water in many communities may have contributed to a reduction in dental caries and the retention of permanent teeth. In addition, the growing availability of employment-related dental benefits probably promoted more widespread use of dental services (see *Dental insurance and use of dental services*).

A higher percentage of women than men had seen a dentist in 2003: 66% versus 61%. The likelihood of dental consultation declined steadily with age, from more than 60% at ages 25 to 54 to 46% of seniors. Up to age 45, consultation rates for women exceeded those for men (data not shown).

Across the country

An estimated 7 in 10 (70%) Ontario residents had consulted a dentist in 2003. At 67%, use of dental services in British Columbia also exceeded the national average. By contrast, use was just 46% in Newfoundland and Labrador, and was also below the national level in Québec, New Brunswick, Saskatchewan and the three Territories. Provincial/territorial differences in funding of dental care, access to dental insurance through employment, location of services, and oral health could all influence consultation rates.[1]

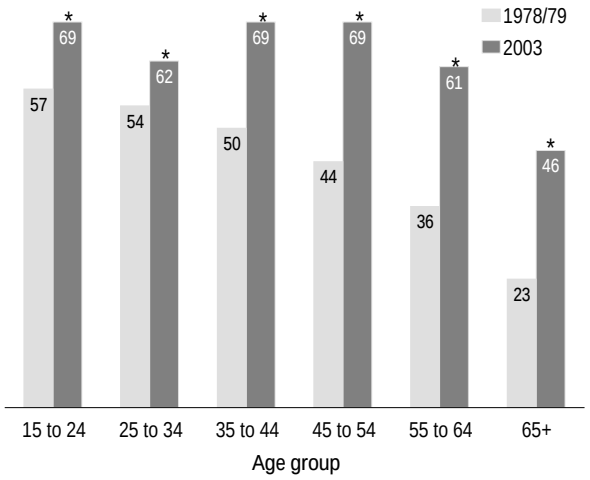
Residents of rural areas were less likely than those in urban areas to have consulted a dentist in the past year.

Education, income

Education and household income were both associated with dental consultations. While 47% of people with less than high school graduation reported a visit, the figure for college/university graduates was 70%. Similarly, 44% of residents of the lowest income households had consulted a dentist in the past year, compared with 77% of those in the highest income households. In most cases, regardless of education and household income, rates of dental consultation were higher among women than men.

From 1978/79 to 2003, there was an increase in the proportion of people in each age group who had consulted a dentist. For people at each education level, the consultation rate also rose. Large increases in consultation rates in the upper-middle and high household income groups meant that the gap in consultation rates between residents of high- and low-income households widened from 23 percentage points in 1978/79 to 34 in 2003 (data not shown).

Percentage of people who consulted dentist in past year, 1978/79 and 2003

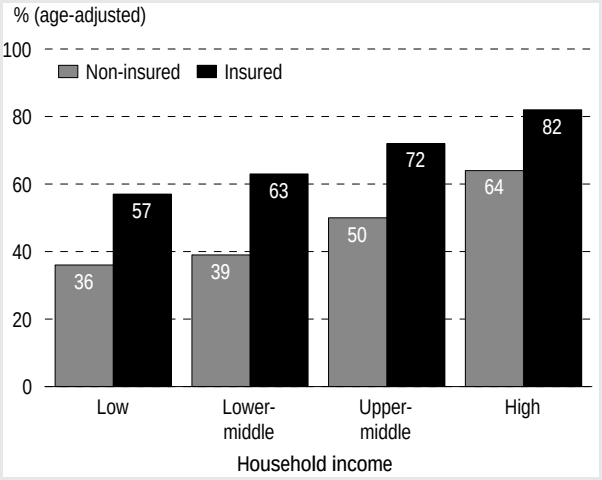


Data sources: 2003 Canadian Community Health Survey; 1978/97 Canada Health Survey
** Significantly higher than estimate for 1978/79 ($p < 0.05$)*

Dental insurance and use of dental services

Dental insurance was an important factor influencing dental visits. In 2003, about three-quarters (74%) of people who had benefits to help cover all or part of their dental expenses had consulted a dentist in the past year, compared with 48% of the non-insured. Nonetheless, even if they were insured, people in lower-income households were less likely than those in the higher-income group to have seen a dentist.

Percentage of people who consulted dentist in past year, by dental insurance status and household income



Data source: 2003 Canadian Community Health Survey
Note: The income gradients among the insured and non-insured are both significant; the differences within each income group by insurance status are also significant.

Percentage of people who consulted dentist in past year, by education and household income

	Total	Men	Women
		%	
Education			
Less than high school graduation	47	47	46
High school graduation	64	61	66*
Some postsecondary	64	60	68*
College/University graduation	70	67	73*
Household income			
Low	44	43	45
Lower-middle	49	45	53*
Upper-middle	64	59	69*
High	77	74	80*

Data source: 2003 Canadian Community Health Survey
** Significantly higher than estimate for men ($p < 0.05$)*

Reasons for not seeking care

Among people who had not visited a dentist in the past three years, 31% said they did not think it was necessary, and 27% reported wearing dentures (Table B). One in ten respondents had simply "not gotten around to it"; 5% mentioned "pain or embarrassment," and 18% cited cost.

Once again, differences by household income and insurance status were apparent. About one in five (22%) of the low income group mentioned cost, compared with just 9% of the high income group. Similarly, while 26% of the non-insured population cited cost, just 7% of the insured group gave cost as a reason for not seeing a dentist in the past three years.

Data sources

The information in this report is from the 2003 Canadian Community Health Survey (CCHS) and the 1978/79 Canada Health Survey (CHS).

The CCHS is a general health survey that covers the household population aged 12 or older.[2] It does not include residents of Indian reserves, Canadian Forces bases, and some remote areas. Data for cycle 2.1 were collected between January and December 2003. The overall response rate was 80.6%; the total sample size was 135,573.

The CHS took place from May 1978 through March 1979. The survey covered the non-institutionalized population, excluding residents of the territories, Indian reserves and remote areas. The sample size was 12,218 households.[3]

The sample sizes for the population aged 15 or older analyzed in this article were 35,927 for the CCHS and 23,791 for the CHS, representing populations of 25.3 million and 17.5 million, respectively.

To account for the multi-stage sample design of the CCHS, the bootstrap technique was used to calculate confidence intervals and coefficients of variation and also to test the statistical significance of differences. A significance level of $p < 0.05$ was applied in all cases.[4-7] Bootstrap weights were not available for the CHS; the standard errors of prevalence rates were estimated with SUDAAN.[8]

The Questions

To measure *dental consultations*, respondents to the 2003 Canadian Community Health Survey (CCHS) were asked: "In the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with a dentist or orthodontist?" The 1978/79 Canada Health Survey (CHS) asked: "During the past 12 months, how many times did you see or talk to a dentist?"

Household income was based on quintiles; for this analysis, four categories were established: low (quintiles 1 and 2), lower-middle (3), upper-middle (4) and high (5). The data are not strictly comparable because the CHS variable was based on economic families; the CCHS variable, on households. An economic family is a group of two or more persons who live in the same dwelling and who are related by blood, marriage, adoption or common-law. A household is a person or group of people who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada.[9]

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References

1 Millar WJ, Locker D. Dental insurance and use of dental services. *Health Reports* (Statistics Canada, Catalogue 82-003) 1998; 11(1): 1-13.

2 Béland Y. Canadian Community Health Survey—Methodological overview. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; 13(3): 9-14.

3 Statistics Canada, Health and Welfare Canada. *The Health of Canadians: Report of the Canada Health Survey* (Statistics Canada, Catalogue 82-538E) Ottawa: Minister of Supply and Services Canada, 1981.

4 Korn EL, Graubard MA. Epidemiological studies utilizing surveys: Accounting for the sampling design. *American Journal of Public Health* 2002; 81(9): 1166-73.

5 Rao JNK, Wu CFJ, Yue K. *Some Recent Work on Resampling Methods for Complex Surveys*. Ottawa: Statistics Canada, 1992.

6 Rust KF, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5: 283-310.

7 Yeo D, Mantel H, Liu TP. *Bootstrap Variance Estimation for the National Population Health Survey*. Proceedings of the Survey Research Methods Section. Baltimore: American Statistical Association, 1999.

8 Shah BV, Barnwell BG, Bieler GS. *SUDAAN User's Manual, Release 7.5*. Research Triangle Park, North Carolina: Research Triangle Institute, 1997.

9 Statistics Canada. *1996 Census Dictionary, Final Edition* (Statistics Canada, Catalogue 92-351-UPE) Ottawa: Minister of Industry, 1999.

Table A

Dental consultations in past year, household population aged 15 or older, 2003

	Sample	Population	Dental consultation
		'000	%
Total	35,927	25,307	63
Sex			
Men	16,290	12,426	61*
Women	19,637	12,881	66*
Age group			
15-24	5,124	4,201	69*
25-34	5,581	4,152	62
35-44	5,953	5,310	69*
45-54	6,097	4,623	69*
55-64	5,367	3,237	61*
65+	7,805	3,785	46*
Province/Territory			
Newfoundland and Labrador	1,767	441	46*
Prince Edward Island	1,278	113	64
Nova Scotia	2,495	757	61
New Brunswick	1,657	610	51*
Québec	6,116	6,070	56*
Ontario	7,397	9,792	70*
Manitoba	2,731	873	61
Saskatchewan	1,665	755	53*
Alberta	4,119	2,468	62
British Columbia	4,342	3,361	67*
Yukon Territory	734	24	49*
Northwest Territories	978	31	68*
Nunavut	648	13	56*
Education			
Less than high school graduation	10,275	5,757	47*
High school graduation	6,200	4,622	64
Some postsecondary	2,646	2,041	65
College/University graduation	16,220	12,344	71*
Missing	586	544	57
Household income			
Low	3,957	1,945	44*
Lower-middle	6,869	4,199	48*
Upper-middle	10,520	7,449	64
High	8,852	7,681	78*
Missing	5,729	4,034	61
Rural/Urban			
Rural	9,521	4,829	56*
Urban	26,406	20,478	65*

Data source: 2003 Canadian Community Health Survey
Note: Because of rounding, detail may not add to totals.
** Significantly different from value for total (p < 0.05)*

Table B

Selected reasons† for not visiting dentist in past three years, by household income and dental insurance status, household population aged 15 or older, Canada, 2003

		Reason for not visiting dentist†				
	Number	Unnecessary	Wears dentures	Cost	Not gotten around to it	Pain or embarrassment
	'000	Age-adjusted %				
Household income	4,714	31	27	18	10	5
Low	619	28	33	22	9[E2]	3[E1]
Lower-middle	1,260	31	27	23	7	4[E2]
Upper-middle	1,303	34	28	16	11	5
High	678	29	21	9[E1]	15[E1]	8[E1]
Missing	853	30	26	18	9[E2]	F
Dental insurance						
Yes	1,559	30	28	7	12	7
No	3,030	32	26	26	9	3[E1]
Missing	125	25[E1]	24	F	F	F

Data source: 2003 Canadian Community Health Survey
Note: Detail may not add to totals because of rounding.
† Respondents may have given more than one reason.
E1 Coefficient of variation between 16.6% and 25.0%
E2 Coefficient of variation between 25.1% and 33.3%
F Coefficient of variation greater than 33.3%

VISION PROBLEMS AMONG SENIORS

Wayne J. Millar

About half (51%) of the population aged 12 or older had a vision problem in 2003, according to data from the Canadian Community Health Survey (CCHS). Some of the more serious vision problems, which may diminish quality of life and increase the risk of social isolation, depression and injury, can be especially problematic for seniors.[1-3] Seniors make up just 14% of the population aged 12 or older, yet they accounted for 23% of all people with vision problems, and nearly 20% of all consultations with eye doctors in 2003.

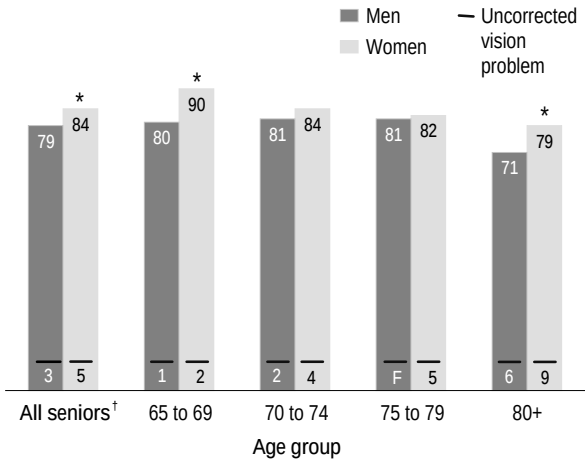
Aging and vision problems

Many older people experience problems with their vision, ranging from difficulty reading or watching television to more serious impairments such as being unable to drive or read. About 3 million Canadian seniors—82% of the population aged 65 or older—reported having a vision problem in 2003 (Table A). Newfoundland and Labrador (79%) and Alberta (79%) were the only provinces where the proportion of seniors with vision problems differed from the national figure.

Overall, the proportion of senior women with vision problems was higher than that for their male counterparts.

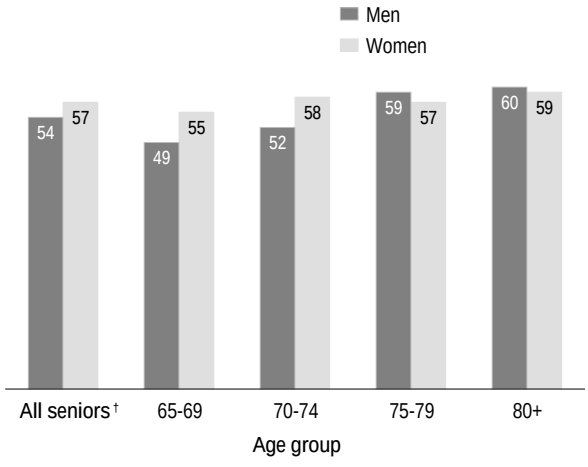
Although most seniors with vision problems reported that their difficulties had been corrected (78%), 4% had "uncorrected" problems, which include those not amenable to correction. The proportion of uncorrected vision problems was highest (8%) at age 80 or older.

Percentage of seniors with vision problems



Data source: 2003 Canadian Community Health Survey
† Age-adjusted
** Significantly higher than estimate for men ($p < 0.05$)*
F Coefficient of variation greater than 33.3%

Percentage of seniors who consulted opthalmologist/ optometrist in past year



Data source: 2003 Canadian Community Health Survey
† Age-adjusted

Consultations with eye doctors

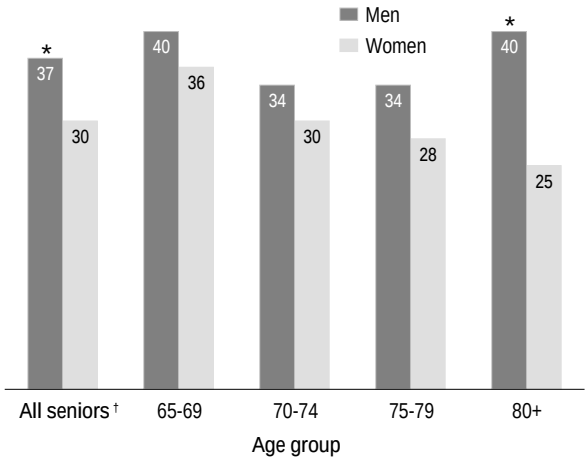
In 2003, over half (56%) of seniors had consulted an ophthalmologist or optometrist in the past year. Among the most elderly, proportions were similar: about 6 in 10 had had consultations with eye care specialists. Regardless of age group, there was no difference in consultation rates of men and women. "Consultation," however, does not necessarily imply that an examination was conducted.

Insurance

One-third of seniors stated that they had insurance to cover all or part of the costs of eye glasses or contact lenses. In the 65-to-69 age group, the proportion with vision care insurance (38%) was higher than the national rate; and at age 80 or older the rate (30%) was lower than the national average. Men (37%) were more likely than women (30%) to state that they had vision care insurance.

In Prince Edward Island, Nova Scotia, New Brunswick, Ontario and Alberta, the percentage of seniors with vision care insurance was higher than the national rate of 33%. Québec's rate was 18%. Most provinces have some provision for vision care for seniors.

Percentage of seniors with vision care insurance



Data source: 2003 Canadian Community Health Survey
† Age-adjusted
** Significantly higher than estimate for women (p < 0.05)*

Cataracts

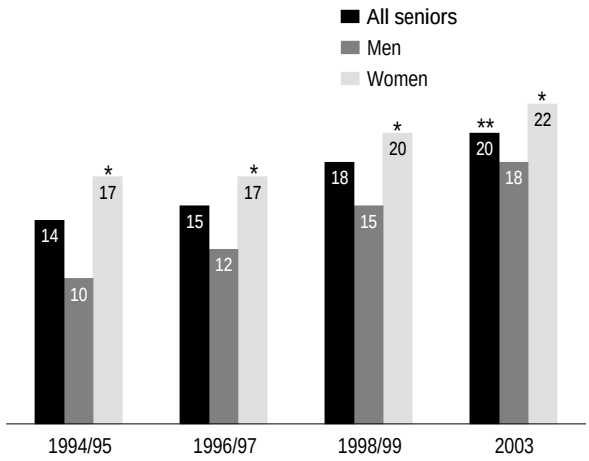
Cataracts, a clouding of the eye's lens, are a leading cause of vision impairment among seniors. Left untreated, cataracts can result in a progressive, painless loss of vision,[4] so surgery may eventually be necessary. Cataract surgery is generally successful at restoring vision.[5,6]

Between 1994/95 and 2003, the proportion of seniors with cataracts rose from 14% to 20%. The proportion of men with cataracts rose from 10% to 18%; for women, the corresponding figures were 17% and 22%. The increase occurred in all senior age groups.

In 2003, at ages 65 to 69, the proportion reporting cataracts was just 12%, but by age 80 or older, 28% were affected. The overall proportion of women was higher than that for men because of a higher prevalence of cataracts among women aged 70 to 74. There was no difference by sex in the other age groups.

Greater awareness of treatment possibilities among seniors, resulting in a higher demand for surgery, may be a factor in increased reporting of cataracts. In the past, cataract removal was mainly an inpatient procedure, but is now generally performed as day surgery. Surgical technique has also improved.[7]

Percentage of seniors with cataracts



Data sources: 1994/95-1998/99 National Population Health Survey; 2003 Canadian Community Health Survey
** Significantly different than estimate for men (p < 0.05)*
*** Significantly different than estimate for all seniors in 1994/95 (p < 0.05)*

Glaucoma

Glaucoma encompasses a number of conditions associated with pressure in the eye. Changes in eye pressure may cause irreversible damage to the optic nerve, with consequent vision loss or blindness. Symptoms may not be apparent until late in the disease, but with detection and treatment, vision can be preserved.[8,9]

In 2003, 241,000 seniors (6%) had glaucoma. Prevalence increased with age, peaking in the oldest age group. The overall prevalence of glaucoma was

Percentage of seniors with cataracts or glaucoma

	Both sexes	Men	Women
	%	%	%
Cataracts			
All seniors	20	18	22
65 to 69	12*	11*	13*
70 to 74	19	16	22
75 to 79	26*	25*	27*
80+	28*	25*	30*
Glaucoma			
All seniors	6	6	7
65 to 69	4*	4*[E1]	4*[E1]
70 to 74	6	6[E1]	6
75 to 79	7	6[E1]	8
80+	10*	9*	10*

Data source: 2003 Canadian Community Health Survey
** Significantly different from estimate for all seniors ($p < 0.05$)*
E1 Coefficient of variation between 16.6% and 25.0%

higher among women than men, but the difference reflected higher rates among women in the 75-to-79 and 80-or-older age groups.

Between 1994/95 and 2003, the prevalence of glaucoma increased from 5% to 6%—a change attributable to an increase among women. In 2003, 7% of women had been diagnosed with glaucoma, compared with 5% in 1994/95. The rate for men did not change during the period.

Diabetes

Diabetes is an important cause of blindness and other vision problems. In 2003, about 13% of seniors had been diagnosed with diabetes (data not shown). For corrected vision problems, the proportions of diabetics and non-diabetic seniors did not differ substantively from the national figures. However, 6% of seniors with diabetes reported an uncorrected vision problem, compared with 4% of non-diabetics (Table A). Since diabetics are more likely (63%) than non-diabetics (55%) to have consulted an eye doctor in the past year, they were more likely to have any vision problems diagnosed. A problem may be uncorrected because a diabetic might be waiting for surgery, as in the case of cataracts, or the problem might be one that is not amenable to correction.

The Questions

The estimates of seniors with *vision problems* were based on responses to the following questions:

- Are you usually able to see well enough to read ordinary newsprint without glasses or contact lenses?
- Are you usually able to see well enough to read ordinary newsprint with glasses or contact lenses?
- Are you able to see at all?
- Are you able to see well enough to recognize a friend on the other side of the street without glasses or contact lenses?
- Are you able to see well enough to recognize a friend on the other side of the street with glasses or contact lenses?

For this analysis, responses were grouped into three, possibly overlapping, categories: vision problems, corrected vision problems, and uncorrected vision problems.

The prevalence of *cataracts* or *glaucoma* was based on self-reported information from a series of questions about diagnosed chronic conditions.

Consultation with an eye specialist was based on responses to: "In the past 12 months, how many times have you seen or talked on the telephone with an eye specialist (such as an ophthalmologist or optometrist)?"

Insurance for vision care was based on responses to: "Do you have insurance that covers all or part of the costs of eye glasses or contact lenses."

Vision disabilities

Statistics Canada's Participation and Activity Limitation Survey (PALS) collected information about people whose everyday activities were limited because of a health-related condition or problem. PALS defined a vision disability as "difficulty in seeing ordinary newsprint or clearly seeing the face of someone from four metres" with glasses or contact lenses. Therefore, PALS estimates of "vision disabilities" differ from estimates of "vision problems" based on data from the CCHS. According to PALS, 8.5% of the population aged 55 or older had a disability related to vision in 2001. More information about vision disability in PALS is available in a recent publication.[10]

Data sources

Data from the 2003 Canadian Community Health Survey (CCHS) and the 1994/95, 1996/97 and 1998/99 National Population Health Survey were used to produce the estimates of vision problems, including cataracts and glaucoma.

The CCHS is a general health survey that covers the household population aged 12 or older.[11] It does not include residents of Indian reserves, Canadian Forces bases, and some remote areas. Data for cycle 2.1 were collected between January and December 2003. The overall response rate was 80.6%, and the sample size was 135,573. The sample for the population analyzed in this article—65 or older—was 13,820, representing 3.8 million seniors. To account for the multi-stage sample design of the survey, the bootstrap technique was used to calculate confidence intervals and coefficients of variation, and to test the statistical significance of differences. A significance level of $p < 0.05$ was applied in all cases.[12-15] Summary measures were age-adjusted to the 2003 population aged 65 or older.

Although diabetic retinopathy and age-related macular degeneration are important causes of vision loss, information on these two conditions is not available in the CCHS.

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References

1 Lee P, Smith JP, Kington R. The relationship between self-rated vision and hearing to functional status and well-being among seniors 70 years and older. *American Journal of Ophthalmology* 1999; 127(4): 447-52.

2 Lord SR, Dayhew J. Visual risk factors for falls in older people. *Journal of the American Geriatrics Society* 2001; 49(5): 508-15.

3 Ivers RQ, Norton R, Cumming RG, et al. Visual impairment and risk of hip fracture. *American Journal of Epidemiology* 2000; 152(7): 633-9.

4 Berkow R, Beers MH, Fletcher AJ, eds. *The Merck Manual of Medical Information.* Whitehouse Station, New Jersey: Merck Research Laboratories, 1977.

5 Monestam E, Wachtmeister L. Impact of cataract surgery on visual acuity and subjective functional outcomes: a population-based study in Sweden. *Eye* 1999; 3(Pt 6): 711-9.

6 Javitt JC, Kendrix M, Tielsch JM. Geographic variation in utilization of cataract surgery. *Medical Care* 1995; 33: 90-105.

7 Naylor DC, Buhrman R, DeBoer DP. Lens extraction: Variations in selected surgical procedures and medical diagnoses, by year and region. In: Goel V, Williams JI, Anderson Gm, et al., eds. *Patterns of Health Care in Ontario: The ICES Practice Atlas*, Second Edition. Ottawa: Canadian Medical Association, 1996.

8 Michelson G, Groh MJ. Screening models for glaucoma. *Current Opinions in Opthalmology* 2001; 12(2): 105-11.

9 Chen PP. Risk and risk factors for blindness from glaucoma. *Current Opinions in Opthalmology* 2004; 15(2): 107-11.

10 Cossette L, Duclos E. *A Profile of Disability in Canada, 2001*(Statistics Canada, Catalogue 89-577-XIE) Ottawa: Minister of Industry, 2002.

11 Béland Y. Canadian Community Health Survey—Methodological overview. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; 13(3): 9-13.

12 Korn EL, Graubard MA. Epidemiological studies utilizing surveys: Accounting for the sampling design. *American Journal of Public Health* 1991; 81(9): 1166-73.

13 Rao JNK, Wu CFJ, Yue K. Some recent work on resampling methods for complex surveys. *Survey Methodology* (Statistics Canada, Catalogue 12-001) 1992; 18(2): 209-17.

14 Rust KF, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5(3): 283-310.

15 Yeo D, Mantel H, Liu TP. *Bootstrap Variance Estimation for the National Population Health Survey.* Proceedings of the Survey Research Methods Section. Baltimore: American Statistical Association, 1999.

Table A

Age-adjusted rates, selected indicators of vision problems and vision care for seniors

	Sample	Population	Vision problems			Consulted eye specialist in past year
			Total	Corrected	Uncorrected	
		'000	%	%	%	%
Age group						
All seniors	13,820	3,780	82	78	4	56
65-69	4,026	1,214	85*	83*	2*E1	52*
70-74	3,611	988	82	79	3*E1	55
75-79	2,925	791	82	78	4	58
80+	3,258	787	76*	68*	8*	59*
Men	5,390	1,657	79	76*	3*	54
65-69	1,797	579	80	79	1*E1	49*
70-74	1,478	466	81	79	2E1	52
75-79	1,113	346	81	78	F	59*
80+	1,002	266	71*	65*	6*E1	60*
Women	8,430	2,123	84	80*	5*	57
65-69	2,229	635	90*	87*	2*E1	55
70-74	2,133	522	84	80*	4E1	58
75-79	1,812	445	82	78	5E1	57
80+	2,256	521	79*	70*	9*	59
Diabetic status						
Diabetic	1,949	503	81	74*	6*	63*
Not diabetic	11,850	3,272	82	78*	4*	55*
Missing	21	5	F	F	F	F
Province						
Newfoundland and Labrador	702	61	79	74	5E1	43*
Prince Edward Island	496	18	85	80	5E2	61
Nova Scotia	1,228	120	85*	82	3E1	55
New Brunswick	1,142	93	85*	81	4E1	51
Québec	5,631	927	82	78	4	54
Ontario	1,698	1,458	82	78	3	61*
Manitoba	698	143	80	76	4E1	48*
Saskatchewan	492	134	81	74	7*E1	51
Alberta	755	302	79	75	4E1	54
British Columbia	978	525	83	78	5E1	51*

Data source: 2003 Canadian Community Health Survey
Notes: For age comparisons, the total estimate for Canada was used as the reference category. Because of rounding, detail may not add to totals.
** Significantly different from reference category ($p < 0.05$)*
E1 Coefficient of variation between 16.6% and 25.0%
E2 Coefficient of variation between 25.1% and 33.3%
F Coefficient of variation greater than 33.3%


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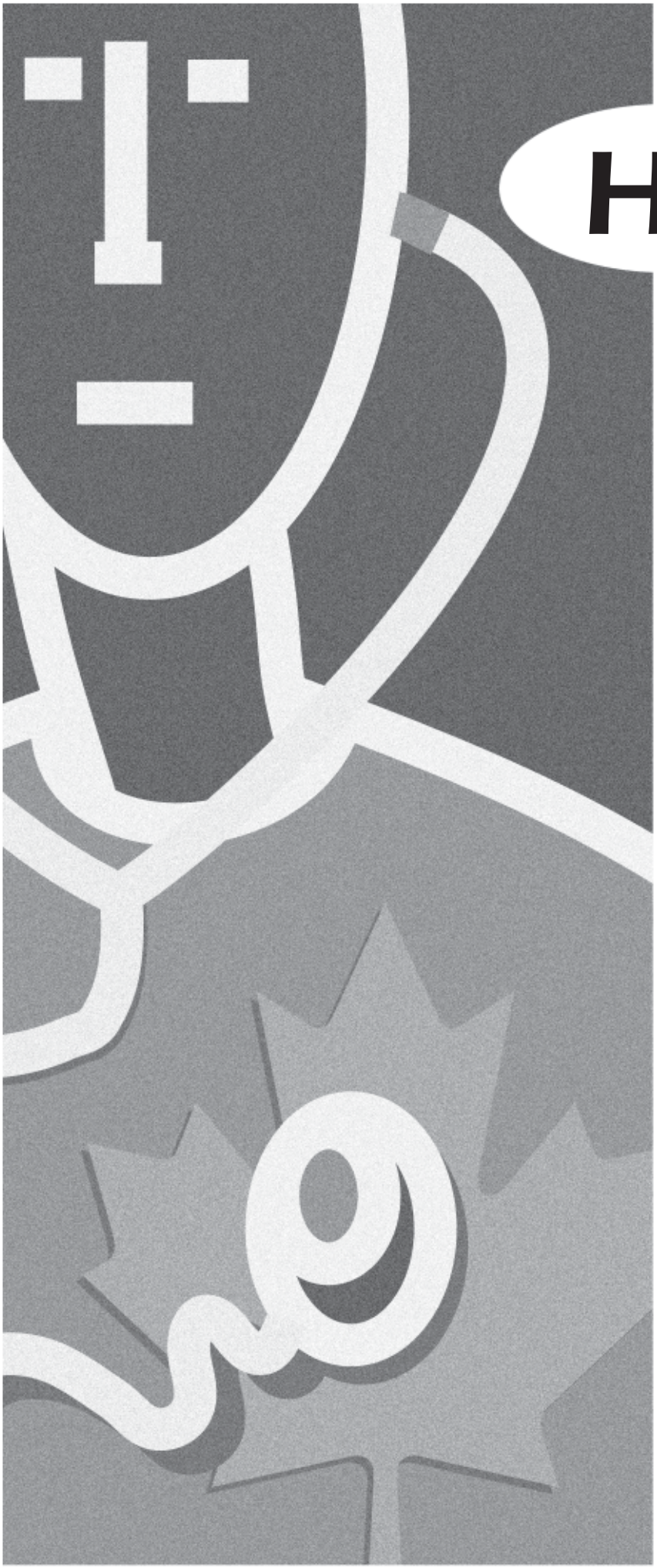

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