

DISEASES OF THE CIRCULATORY SYSTEM — HOSPITALIZATION AND MORTALITY

by Helen Johansen, Satha Thillaiampalam, Denis Nguyen and Christie Sambell

Diseases of the circulatory system are the major cause of illness, disability, and death in Canada.¹ The most common of these diseases are ischemic heart disease (which includes acute myocardial infarction or heart attack), congestive heart failure, and cerebrovascular disease (stroke).

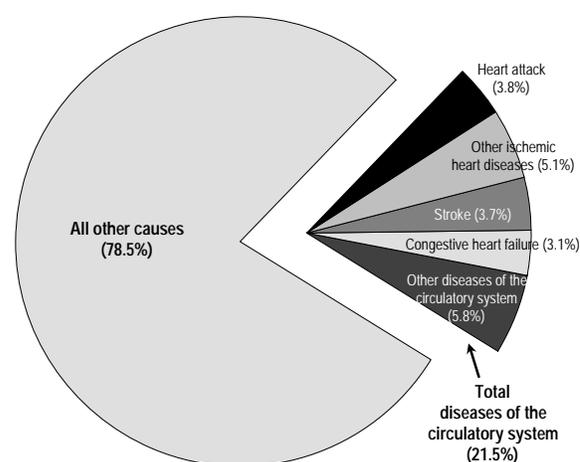
A heart attack is typically caused by a blockage (usually a blood clot) in a coronary artery that severely restricts or cuts off the blood supply to a region of the heart. If this lasts more than a few minutes, heart tissue dies.² Congestive heart failure occurs when the heart can no longer pump blood at the rate needed by the body's tissues. A stroke involves loss of brain function when a clot or piece of atherosclerotic plaque breaks away from another area of the body and blocks a blood vessel in the brain (ischemic), or when a blood vessel in the brain bursts (hemorrhagic), thereby allowing blood to leak into an area of the brain and destroy it.³

Leading cause of hospitalization

In 2001/02, more than 309,000 people were hospitalized because of diseases of the circulatory system. Some of these patients were admitted more than once for the same or related problems, so this group of diseases accounted for an even greater number of hospitalizations (separations) that year: 419,000.

By either measure—patients or separations—diseases of the circulatory system were the leading cause of hospitalization for adults, representing 26% of male patients aged 20 or older (24% of separations) and 18% of female patients (17% of separations, excluding pregnancy and childbirth).

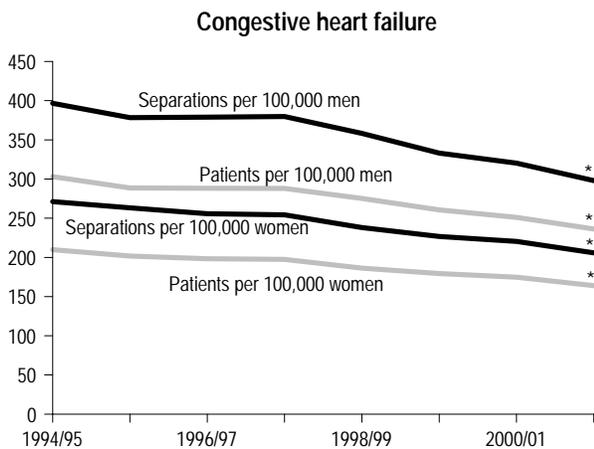
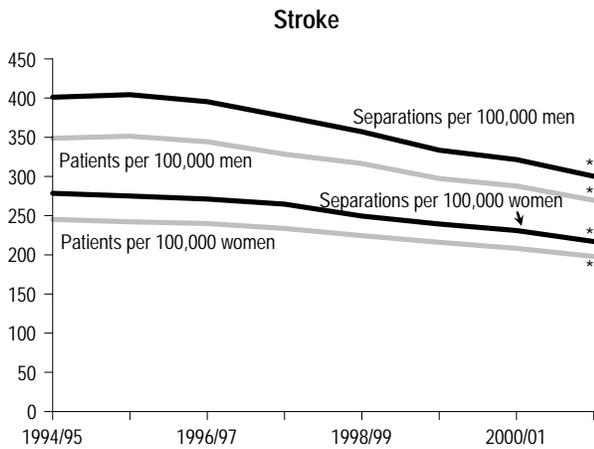
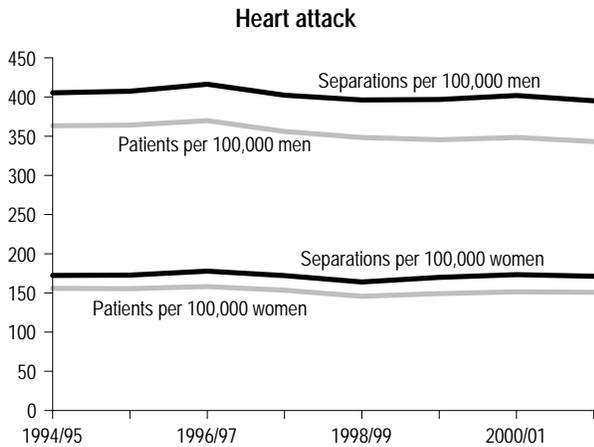
Percentage of patients aged 20 or older[†] hospitalized for diseases of the circulatory system, Canada, 2001/02



Data source: Health Person-oriented Information Database
[†] Excluding pregnancy and childbirth

Although diseases of the circulatory system accounted for large shares of patients and separations, age-standardized hospitalization rates for this disease group fell substantially between 1994/95 and 2001/02. Based on patients, the rate went from 1,656 to 1,339 per 100,000 population aged 20 or older. For separations, the rate fell from 2,268 to 1,813 per 100,000. The trend was similar for each of the major circulatory system diseases, and for both men and women, although the size of the declines varied.

Age-adjusted[†] hospitalization rates for heart attack, stroke and congestive heart failure, by sex, Canada, 1994/95 to 2001/02



Data source: Health Person-oriented Information Database
[†] Age-standardized to distribution of 2001 population aged 20 or older (five-year age groups)
 * Significant decrease in trend from 1994/95 to 2001/02 ($p < 0.05$)

Number of patients

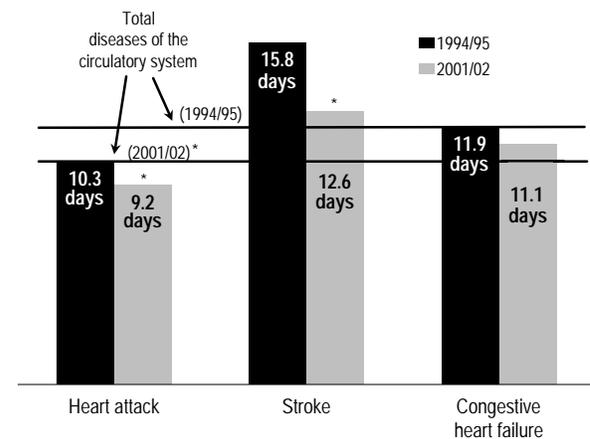
Overall, the total number of patients admitted to hospital for diseases of the circulatory system in 2001/02 (309,000) was down more than 4% from the 1994/95 figure (323,600). However, the decline in numbers did not apply to all diseases in this group. For instance, the number of heart attack patients actually rose from about 49,000 in 1994/95 to more than 55,000 in 2001/02. This likely reflects the increasing elderly population, the age group most likely to be hospitalized for such diseases.

Fewer hospital days

In 2001/02, diseases of the circulatory system accounted for 3.3 million days in acute care hospitals, down from almost 3.9 million days in 1994/95. Much of this decline resulted from a reduction in the average annual number of days in hospital for such patients: from 12.0 to 10.5.

These declines in total days and average annual days per patient mask trends for particular diseases. For example, the annual number of days per patient

Average annual number[†] of hospital days per patient for heart attack, stroke, congestive heart failure and total diseases of the circulatory system, Canada, 1994/95 and 2001/02



Data source: Health Person-oriented Information Database
[†] Age-/Sex-standardized to distribution of all circulatory system disease patients aged 20 or older in 1994/95 (five-year age groups)
 * Significantly lower than 1994/95 ($p < 0.05$)

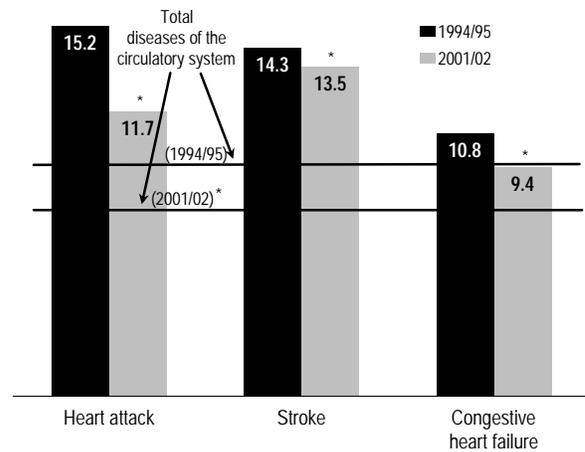
attributed to heart attack rose slightly over the period from 498,700 to 508,400, despite a reduction in average annual days per patient (from 10.3 to 9.2). By contrast, the total number of hospital days attributed to congestive heart failure decreased significantly, from 606,700 to 529,800, but the drop in average annual days per patient was not significant (11.9 to 11.1).

Mortality

The proportion of patients hospitalized for diseases of the circulatory system who die in hospital declined from 9.6% in 1994/95 to 8.4% in 2001/02. For heart attack patients, the drop was particularly sharp: from 15.2% to 11.7%.

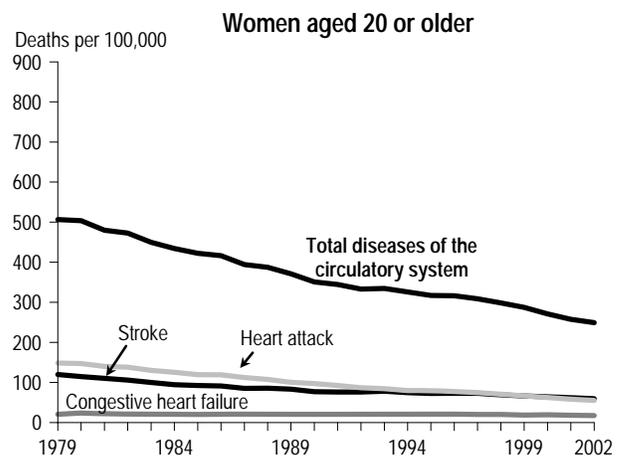
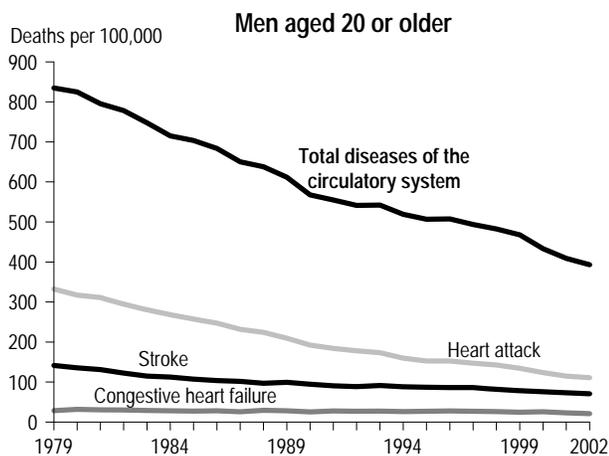
In fact, overall mortality (not just in-hospital deaths) from diseases of the circulatory system declined over two decades. For men aged 20 or older, the age-standardized rate fell from 835 deaths per 100,000 in 1979 to 393 in 2002; for women of the same ages, from 506 to 249. But while mortality

Percentage[†] of heart attack, stroke, congestive heart failure and total circulatory system disease patients who died in hospital, Canada, 1994/95 and 2001/02



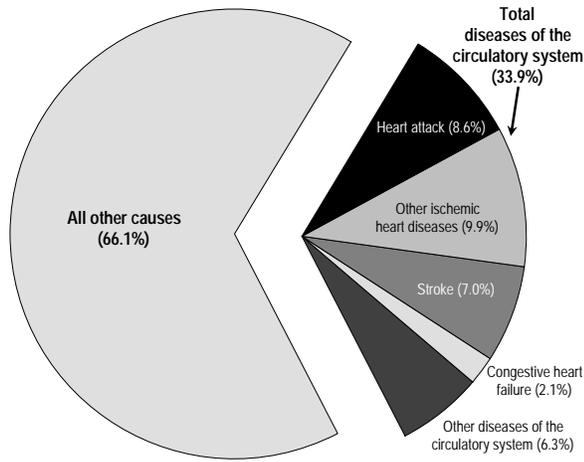
Data source: Health Person-oriented Information Database
 † Age-/Sex-standardized to distribution of all circulatory system disease patients aged 20 or older in 1994/95 (five-year age groups)
 * Significantly lower than 1994/95 ($p < 0.05$)

Age-standardized[†] mortality rates for selected diseases of the circulatory system, Canada, 1979 to 2002



Data source: Canadian Mortality Database
 † Age-standardized to 2001 population aged 20 or older (five-year age groups)

Percentage of deaths' attributable to diseases of the circulatory system, Canada, 2002



Data source: Canadian Mortality Database
† Aged 20 or older

rates for heart attack and stroke dropped steadily, the rate for congestive heart disease was relatively stable.

In 2002, diseases of the circulatory system accounted for 74,530 deaths (34%) of people older than 20 and remained the leading cause of death of adults, at 311 deaths per 100,000 population (cancer ranked second at 273 deaths per 100,000).

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Data sources

Data on hospital separations and patients are from the Health Person-oriented Information (HPOI) Database, maintained by Statistics Canada. To determine the number of patients, acute care hospital records for each province for fiscal years 1994/95 to 2001/02 were linked using patient identification numbers. Only records for acute care hospitals and with stays less than 90 days were used.

Data on deaths attributed to diseases of the circulatory system are from the Canadian Mortality Database, which is maintained by Statistics Canada. The data are abstracted and compiled from death certificates by the vital statistics registrar in each province and territory.

Causes of hospitalization and death before 2000 were defined according to the *International Classification of Diseases, Ninth Revision (ICD-9)*,⁴ and those occurring in 2000 or later, according to the tenth revision of this volume (ICD-10).⁵

ICD-9 category titles	ICD-10 category titles	ICD-9 codes	ICD-10 codes
Diseases of the circulatory system	Diseases of circulatory system	390-459	I00-I99
Ischemic heart diseases	Ischemic heart diseases	410-414	I20-I25
Acute myocardial infarction (heart attack)	Acute myocardial infarction	410	I21
Stroke (cerebrovascular disease)	Cerebrovascular diseases	430-438	I60-I69
Congestive heart failure	Congestive heart failure	428	I50

Hospitalization and mortality rates were standardized to the age (five-year age groups) and sex distribution of the 2001 (July 1) population aged 20 or older. All hospital visits for each patient were combined into episodes to determine the total number of days each patient spent in hospital within the year. The average number of hospital days per patient within a year and the percentage of patients who die in hospital were age-/sex-standardized based on the distribution of all circulatory system disease patients in 1994/95. Changes in rates from 1994/95 to 2001/02 based on HPOI data were tested for significance using linear regression. The model utility test was used to determine if the slope differed significantly from 0.

References

- 1 Heart and Stroke Foundation of Canada. *The Growing Burden of Heart and Stroke in Canada 2003*. Ottawa: Heart and Stroke Foundation, 2003.
- 2 Berkow R, Beers MH, Fletcher AJ, eds. *The Merck Manual of Medical Information*. Merck & Co., Inc.: Whitehouse Station, New Jersey, 1997.
- 3 NINDS Stroke Information Page. (<http://www.ninds.nih.gov/disorders/stroke/stroke.htm>). Accessed March 22, 2005. Office of Communications and Public Liaison, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, Maryland.
- 4 World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death*. Based on the Recommendations of the Ninth Revision Conference, 1975. Geneva: World Health Organization, 1977.
- 5 World Health Organization. *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision*. Geneva: World Health Organization, 1992.