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# *The Derivation of Life Tables for Local Areas*

*Douglas G Manuel, Vivek Goel and J Ivan Williams*

## Abstract

*Life tables are seldom derived at the local level, despite a shift toward health service planning to that level. We calculated life tables by sex for the 42 public health units in Ontario, using 1988–1992 mortality files. Traditional methods of life table construction were compared and validated. Data quality, particularly geographical coding of death certificates, poses the greatest difficulty in deriving accurate life tables for comparison between areas. Migration will affect estimates, but it is best considered during the interpretation of results. Except for the final age interval, methods of modelling life tables have little impact on final life expectancy estimates. It is feasible to calculate local level life tables with data and tools that are readily available. The results highlight the importance of examining such life tables, as variations within a province in life expectancy at birth may be as important as the differences between provinces.*

***Key words:*** *Demography; demography/methods; health status; health status indicators/standards; life expectancy; life tables; Ontario/epidemiology*

## Introduction

Life tables are a valuable tool for health planning. While their primary use is to model life expectancy at birth, they may be used for many other applications[1] in epidemiology, demography and actuarial studies. In health planning, life tables can be used to derive health expectancy,[2] cause-deleted life expectancy, years of life lost and many other models depicting the burden of disease or poor health for a population.[3] With the shift toward health service planning at the local level, there is clearly a need for such data at that level. However, only recently have applications of life tables been applied at the local level.[a,4–7]

The importance of calculating life expectancy at the local level is illustrated by the fact that, while the difference in life expectancy at birth between provinces is presently approximately 1 1/2 years,[8] the differences are much larger among regions within British Columbia, Alberta, Ontario and Quebec.

Data availability and quality, methodological constraints and lack of resources have been barriers to the development of local life tables. Therefore, this paper describes, compares and discusses means to overcome these barriers so local health planners can derive life tables for their own regions.

## Methods

We used the Ontario Registrar General's mortality files and Statistics Canada's revised population estimates to construct life tables. Five years of deaths (1988–1992), as opposed to the three years generally used for most provincial life tables, were combined to increase the statistical power for local level analysis. Between 1988 and 1992, 358 490 deaths occurred in Ontario (range for public health units: 1,980–29,671). Individual death records were aggregated to the 42 health units from the county of residence recorded on the death certificate. These records were then aggregated by sex and the 19 age groups usually used for calculating abridged life tables (<1, 1–4, 5–9, ... , 85+ years). We used 1990 population estimates for each public health unit, age group and sex for the mid-interval population.

[a] *Local level* varies for the cited reports, but most often refers to health planning regions. In this paper, we define *local level* as the 42 public health departments in Ontario (population range: 40,000–687,000).

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We compared three traditional methods of abridged life table construction (by Chiang, Greville and Reed-Merrell). More complex and sophisticated methods created in the last 25 years were not compared.[9,10] The main difference among all methods lies in the transformation from the observed age-specific death rate to the conditional probability of death for each age group, given survival to the beginning of the age group (for a recent comparative review of methods used to derive life tables for provinces, see Ng and Gentleman, 1995,[11] or Chiang, 1984[12]).

The assumptions used to describe the distribution of deaths within age intervals influences the calculation of the probability of death. These assumptions may vary in their influence for multiple local area comparisons if the age distribution of deaths changes between local areas. Chiang's method assumes that this distribution is the same as in a reference population (Canada, 1991, for this work).[12] Greville's method assumes a constant change in the age-specific death rate and then applies Gompertz's law of mortality to estimate the probability of death.[13] The Reed-Merrell approach is an empiric method based on 33 life tables from 1910.[14]

For most age groups, the probability distribution of death is close to uniform throughout the interval, and the different methods will have little impact on the final life expectancy estimates. Assumptions in the derivation of the probability of death for the first and last age groups (<1 and 85+ years) were examined in greater detail. In the first age group, the distribution of death decreases rapidly immediately after birth. More importantly, the probability distribution of death during the initial age interval may vary between local areas if the infant mortality rate varies. A higher infant mortality is associated with a higher proportion of deaths that occur later in the first year of life from exogenous causes.

The pattern of deaths for any age interval can be expressed as a fraction of life lived by those dying in the interval ($a_i$, where $i$ is the age interval). For the first age group in developed countries, $a_0$ is less than 0.10, as opposed to 0.50 for the age intervals in middle life. We performed sensitivity analysis by varying $a_0$ from 0.07 (value for Canada in 1991) to 0.30 during life table construction using Chiang's method. This analysis examined the method's effect on life expectancy estimates for deriving the probability of death in the initial age group, as well as the effect on estimates if the distribution of deaths varies between health units in the first age group.

The last age group in an abridged life table is open-ended and requires specific assumptions to describe life table functions. By definition, the probability of death for the final age group is equal to 1.00, since everyone in that age group will ultimately die. Most methods use the mortality rate for the entire 85+ age group ($M_{85+}$) to derive the number of years lived for that interval ($L_{85+}$). In reality, the death rate increases with each subsequent year lived at advanced ages. Assuming an unchanged death rate at advanced ages will result in high life expectancy estimates as more people survive past age 85. More importantly, the difference in life expectancy estimates between local areas will become exaggerated if the number of survivors entering the final age group ($l_{85+}$) varies between areas. For these reasons, we compared the common calculation for years lived at age 85 and over ($L_{85+} = l_{85+}/M_{85+}$) with a more pragmatic, accessible assumption of assigning the life expectancy at age 85 from unabridged provincial life tables to all health units.

Standard errors for life expectancy estimates were obtained using a method proposed by Chiang.[12] This method calculates the age interval variance by considering the probability of death as a binomial proportion. More complex methods for deriving variance will yield more stable results than Chiang's method when the number of deaths becomes very small.[9] Life table derivation and statistical comparisons were performed in SAS PC 6.11.[b]

## Results

The three methods examined result in comparable estimates of life expectancy at birth. Not surprisingly, the Reed-Merrell method is less applicable to modern trends in mortality since it was empirically derived using mortality patterns at the turn of the century. Greville's method is more accurate in describing the mortality trends as people age, but is invalid for very young ages, where extrinsic forces (such as accidents) are an important cause of death.

Chiang's method results in the smallest range between health units and, therefore, yields the most conservative estimates when describing differences between local areas (see Figure 1 and Table 1). Even with these conservative estimates, the range in life expectancy between health units is over three times larger than the difference between provinces (6.0 versus 1.7 years for males and 5.7 versus 2.4 years for females, 1991 estimates for provinces[8]).

Varying the fraction of life lived in the first interval of life had little influence on the final life table results. However, the method of calculating the life expectancy for the final age group exerted greater influence, especially for females. While this difference reflects differences in the assumptions, it likely is also influenced by a truly wide range in survival at age 85 and over between health units. The range and dispersion of life expectancy estimates varied only when the method for deriving the final age interval was modified (Figure 1).

We found minimal statistical variation for life expectancy at birth, with standard errors ranging from 0.13

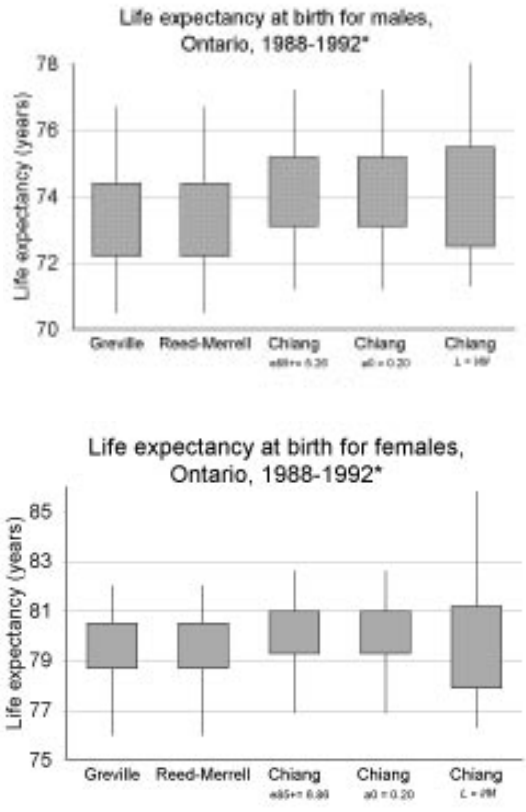
[b] Program code for SAS is available from the authors and at http://www.cehip.org in the "Health Data" section. This program could be adapted for use with other statistical packages or spreadsheet programs for single life table construction. The program includes values of $a_i$ used in this work.

**TABLE 1**

**Life expectancy at birth for the 42 public health units (PHUs) in Ontario, by different methods and assumptions**

| Life expectancy (years) | Greville | Reed-Merrell | Chiang (95% CI) ($e_{85+}$,males = 5.26 yrs, $e_{85+}$,females = 6.86 yrs) | Chiang ($a_0$ = 0.20) | Chiang ($L_{85+} = l_{85+}/M_{85+}$) |
|---|---|---|---|---|---|
| **MALES** | | | | | |
| Highest PHU | 76.7 | 76.7 | 77.2 ± 0.3 | 77.2 | *78.0* |
| 75% | 74.4 | 74.4 | 75.2 | 75.2 | *75.5* |
| Mean | 74.1 | 74.1 | 74.8 | 74.8 | *74.2* |
| 25% | 72.2 | 72.2 | 73.1 | 73.1 | *72.5* |
| Lowest PHU | 70.5 | 70.5 | 71.2 ± 0.3 | 71.2 | *71.3* |
| Range | 6.2 | 6.2 | 6.0 | 6.0 | *6.7* |
| **FEMALES** | | | | | |
| Highest PHU | 82.0 | 82.0 | 82.6 ± 0.5 | 82.6 | *85.8* |
| 75% | 80.5 | 80.5 | 81.0 | 81.0 | *81.2* |
| Mean | 80.5 | 80.5 | 80.9 | 80.9 | *81.0* |
| 25% | 78.7 | 78.7 | 79.3 | 79.3 | *77.9* |
| Lowest PHU | 76.0 | 76.0 | 76.9 ± 0.5 | 76.9 | *76.3* |
| Range | 6.0 | 6.0 | 5.7 | 5.7 | *9.5* |

**FIGURE 1**




* Box and whisker plot for the 42 public health units, using different methods and assumptions of life table construction. Each box indicates the 25–75%, and the whiskers indicate the range in life expectancy at birth.

to 0.40 years across the health units. For males, life expectancy estimates in 30 of 42 health units differed significantly from the Ontario mean ($p < 0.0005$). Generally, Northern and rural health units showed lower male life expectancy estimates than their urban counterparts. The geographical distribution for females was similar, and female life expectancy differed significantly from the Ontario average in 26 health units.

Misclassifying the place of residence on death certificates probably provides the greatest source of error for life table derivation. We examined this influence on final life expectancy estimates by several indirect methods, including sensitivity testing, analysis of age- and cause-specific death rates in outlying health units and reference to direct validation of residence coding by others. For instance, the City of Toronto has a relatively large misclassification error for place of residence on death certificates because of its close geographical proximity to other health units. In 1994, the City of Toronto's Public Health Department validated death certificates from the Registrar General and found approximately 10% of deaths were coded to the City of Toronto when the correct address was often one of the five other surrounding municipalities that make up Metropolitan Toronto (personal communication, F Goettler, 1996). Notably, the Registrar General moved its coding facility and changed coding practices that year.

## Discussion

Methods of abridged life table derivation can be applied to local planning areas using readily available mortality and population data. We would recommend the use of Chiang's method for these reasons: it produces the most conservative

estimates for comparison between local areas; it is easy to calculate (including statistical variance); sensitivity analysis can be performed on the major assumptions; and it is frequently used by others, such as the World Health Organization, allowing for comparability. Chiang's method requires values of $a_i$ from a population with a similar age group distribution of mortality. National or provincial estimates are easily derived[12] from Statistics Canada unabridged life tables[8] (values used for this analysis are available from the authors[b]).

For the final age group, using a standard life expectancy from more accurate life tables for every health unit is a useful method to reduce the large bias in estimates that results with more traditional approaches. Unfortunately, this assumption ignores the 22% of deaths that occur after age 84 and will minimize disparities between local areas. Extending the final age group to 90 years and over (instead of 85+) will create less biased life tables when using a uniform mortality rate in the final age group.

Migration and resident misclassification will result in the greatest error, but the problem is not unique to life tables, applying to most forms of health information at the local level. When comparing life expectancy across local areas, attention should be given to systematic coding errors for place of residence that will inflate the reported deaths in one area while reducing them in another. Such error is likely greatest in metropolitan areas, but may exist in other populations also. In Ontario, the Registrar General is working with local health units to validate residence coding.

Most migration occurs at young ages, when mortality rates are low, so it will have little influence on life expectancy estimates. Migration of the elderly is more likely to influence estimates, since the mortality rate is higher, but biases in life expectancy will occur only if there is sufficient migration and the migrating elderly have a mortality rate different from that of the non-migrating population. Although some elderly people do "migrate" into nursing homes, they do not usually enter a long-term care facility in a different health unit.

We evaluated this potential bias by searching for health units with a disproportionately high probability of death in older age groups compared with young age groups. The probability of death across age groups displayed a consistent pattern. Health units with a high probability of death among the elderly also had a high probability of death in younger people (0.554 unweighted Pearson correlation for probability of death for males aged 10–24 versus 70–74, by health unit). In addition, health units with low life expectancy at birth did not have a disproportionately high probability of death at elderly ages.

The distribution of deaths across ages in health units would indicate that migration of the elderly is unlikely to account for the large differences in life expectancy observed between local areas. Regardless, migration is more accurately considered an issue of construct validity rather than misclassification error. Caution must be applied and local level life expectancy should not be used to "predict" mortality for individuals in a geographic area. Instead, it should be regarded as an intuitive summary measure of cross-sectional mortality data.

As a measure of mortality, life expectancy estimates offer several advantages over more frequently reported standardized mortality rates. Life tables do not require an arbitrary reference population, making estimates easily comparable with other populations and/or time periods. In addition, life expectancy is a widely recognized mortality indicator for the general public.

However, life expectancy estimates share the same challenge as all descriptive mortality indicators when comparing multiple populations: differences are frequently found but are complex to explain. In this situation, other applications of life tables are useful, using the principle of a synthetic cohort subjected to an observed period of mortality, morbidity and prevalence of risk factors. For instance, life tables excluding a given cause of death, whether a specific disease or a risk factor, can meaningfully portray the contribution of the different causes in life expectancy. While similar comparisons are made with absolute deaths and crude mortality rates, they are infrequently applied to standardized mortality rates or used to describe the differences in mortality rates between populations.[15]

Local health planners will find life tables to be robust and unique tools for describing local mortality. Good (and improving) quality data and available methods for life table construction can be applied at the local level. Deriving life tables for populations smaller than Ontario health units or for other jurisdictions primarily depends on the quality of the mortality and population data. The methods and assumptions of deriving life tables exert little influence on life table estimates and comparisons between local populations. For Ontario health units, statistical variation of life expectancy estimates at birth is a small but important source of error. For populations smaller than health units, both the amount and method of deriving statistical variance will become a more important source of error.

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# *Short Report*

## How Provincial and Territorial Legislators View Tobacco and Tobacco Control: Findings from a Canadian Study

*Nicole A de Guia, Joanna E Cohen, Mary Jane Ashley, Roberta Ferrence, David A Northrup and John S Pollard*

### Abstract

*We report on legislators' attitudes and experiences regarding tobacco and tobacco control using findings from a 1996/97 telephone survey of provincial and territorial legislators in Canada. Across all jurisdictions, legislators showed support for a number of tobacco control policies and for a major government role in implementing programs and policies to discourage youth from smoking. Further, substantial numbers of legislators indicated they did not have enough tobacco-related contact with medical and non-profit health organizations. These findings can guide the activities of health agencies, researchers and advocates in support of effective strategies to reduce the public health impact of tobacco use in Canada.*

***Key words**: Attitudes; Canada; legislators; provinces; public policy; territories; tobacco; tobacco control*

### Introduction

Tobacco use is by far the leading cause of preventable mortality, disability and premature death in Canada.[1–4] Further, estimates for 1991 show that smoking-attributable costs in Canada amounted to $15 billion.[5] Strong tobacco control policies are essential components of a comprehensive approach to reducing the health impact of tobacco use. Although Canada has been recognized internationally as a leader in tobacco control legislation,[6] no systematic research has investigated how legislators in Canada view tobacco and tobacco control options, even though they are key players in the public policy process. In this paper, we report on provincial and territorial legislators' perceptions, attitudes and experiences regarding tobacco and tobacco-related policy interventions.

### Methods

All provincial and territorial legislators serving as of October 1996 were asked to take part in a structured 25-minute computer-assisted telephone interview conducted by the Institute for Social Research at York University in Toronto, Ontario. Several methods were used to encourage participation, including seeking study endorsement from key party personnel, maintaining ongoing telephone contact with legislators' offices and sending up to three follow-up letters.

Interviews were conducted with 438 provincial and territorial legislators, yielding an overall response rate of 59% (Table 1). However, because of the extremely low participation rate of members of the National Assembly (MNAs) in Quebec (27%), data from their jurisdiction are not included in the rest of this report. Excluding Quebec, the overall response rate was 65%, with response rates by jurisdiction ranging from 55% in Alberta to 85% in Prince Edward Island. Findings for territorial members of the Legislative Assembly (MLAs) are combined because of low numbers of participants from the Yukon ($n$ = 13; response rate = 76%) and the Northwest Territories ($n$ = 17; response rate = 71%).

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**TABLE 1**

**Response rate and number of interviews, by jurisdiction, provincial and territorial legislators, Canada, 1996/97**

| | Terr | BC | Alta | Sask | Man | Ont | Que | NB | NS | PEI | Nfld | OVERALL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Response rate | 73% | 61% | 55% | 72% | 64% | 60% | 27% | 72% | 68% | 85% | 71% | 59% |
| (Number of interviews) | (30) | (45) | (46) | (41) | (36) | (77) | (34) | (39) | (34) | (22) | (34) | (438) |

Respondents were similar to non-respondents in terms of age, sex, having children and having municipal government experience. Compared to non-respondents, however, legislators who participated had fewer years of service, were less likely to be a minister or party leader and were less likely to belong to a party in power.

## Results

### *Government Responsibility for Health Promotion*

We examined provincial and territorial legislators' attitudes toward the role their level of government should play in five areas of health promotion (Table 2). Support for at least *some* government responsibility for programs and policies in each of the domains was quite high: more than 85% of respondents from all jurisdictions expressed this attitude (data not shown).

However, the level of support for a *major* government role in these health promotion areas varied considerably. Discouraging youth from starting to smoke and preventing alcohol abuse were the two areas receiving the greatest support for a major government role from legislators across the country. Support for major government responsibility in discouraging youth from smoking was 63% overall (ranging from 50% in the Territories to 82% in Nova Scotia), whereas similar support for alcohol abuse prevention was 53% overall (varying from 41% in Saskatchewan to 67% in Manitoba). Support for a major government role in programs and policies aimed at smoking cessation ranged from 34% in Saskatchewan to 62% in Nova Scotia (47% overall). However, in each jurisdiction, the level of support among legislators for a major government role was at its lowest regarding the promotion of physical activity and healthy eating habits (31% and 29% overall, respectively). Compared to legislators from the western provinces, legislators from the Atlantic provinces generally voiced greater support for a major government role in each of the health promotion areas specified.

### *Tobacco-related Contacts*

Table 3 presents information gathered on legislators' contacts regarding tobacco-related issues. Legislators were asked if, over the past two years, they had been contacted about tobacco-related issues in person at least once by representatives from non-profit health organizations, medical associations or the tobacco industry, and at least once by telephone, mail or in person by constituents. In each jurisdiction, legislators were most likely to have been

**TABLE 2**

**Attitudes toward government responsibility in five health promotion areas, by jurisdiction (%), provincial and territorial legislators, Canada, 1996/97**

| | Terr | BC | Alta | Sask | Man | Ont | NB | NS | PEI | Nfld | OVERALL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Support for a *major* government role in ... | | | | | | | | | | | |
| Discouraging youth from starting to smoke | 50 | 60 | 59 | 51 | 67 | 58 | 69 | 82 | 68 | 71 | 63 |
| Preventing alcohol abuse | 63 | 44 | 50 | 41 | 67 | 45 | 59 | 59 | 64 | 62 | 53 |
| Encouraging people to quit smoking | 37 | 44 | 39 | 34 | 47 | 44 | 56 | 62 | 55 | 59 | 47 |
| Encouraging people to be physically active | 23 | 20 | 26 | 29 | 42 | 25 | 44 | 35 | 32 | 44 | 31 |
| Encouraging healthy eating habits | 20 | 24 | 24 | 24 | 28 | 26 | 41 | 32 | 23 | 50 | 29 |

**TABLE 3**

**Contacts regarding tobacco-related issues over past two years,[a] by jurisdiction (%), provincial and territorial legislators, Canada, 1996/97**

| | Terr | BC | Alta | Sask | Man | Ont | NB | NS | PEI | Nfld | OVERALL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Report of at least one tobacco-related contact by ... | | | | | | | | | | | |
| Constituents[b] | 33 | 60 | 83 | 61 | 61 | 71 | 44 | 88 | 82 | 21 | 62 |
| Representatives from non-profit health organizations[c] | 23 | 36 | 76 | 46 | 28 | 61 | 44 | 59 | 73 | 38 | 50 |
| Representatives from medical associations[c] | 17 | 24 | 43 | 29 | 14 | 27 | 33 | 44 | 45 | 21 | 29 |
| Representatives from the tobacco industry[c] | 3 | 4 | 20 | 12 | 14 | 31 | 10 | 12 | 41 | 3 | 16 |
| Report of not enough tobacco-related contact by ... | | | | | | | | | | | |
| Representatives from medical associations | 63 | 31 | 28 | 49 | 42 | 47 | 51 | 56 | 45 | 59 | 46 |
| Representatives from non-profit health organizations | 33 | 29 | 20 | 34 | 36 | 31 | 51 | 53 | 36 | 50 | 36 |

[a] Or since elected, if in office for less than two years
[b] Contact by telephone, mail or in person
[c] Contact in person only

contacted at least once about a tobacco-related issue by constituents (62% overall; ranging from 21% in Newfoundland to 88% in Nova Scotia) and non-profit health organizations (50% overall; ranging from 23% in the Territories to 76% in Alberta). Legislators were less likely to have been contacted by medical associations (29% overall; ranging from 14% in Manitoba to 45% in PEI) and the tobacco industry (16% overall; ranging from 3% in Newfoundland and the Territories to 41% in PEI).

Numerous tobacco-related contacts were reported rarely. The proportions of legislators who reported five or more such contacts over the previous two years with non-profit health organizations, medical associations and the tobacco industry were 15%, 4% and 3%, respectively. With regard to tobacco-related issues, almost half of the legislators said they had not experienced enough contact with medical associations, and more than one third reported not enough contact with non-profit health organizations.

### *Perceptions Regarding Tobacco's Harmful Effects*

Legislators were also asked about their perceptions of the harmful effects of tobacco use (Table 4). A high proportion of them *strongly* agreed that most smokers are addicted to nicotine (78% overall; ranging from 71% in Saskatchewan to 91% in PEI). Furthermore, a majority

**TABLE 4**

**Perceptions regarding the harmful effects of tobacco use, by jurisdiction (%), provincial and territorial legislators, Canada, 1996/97**

| | Terr | BC | Alta | Sask | Man | Ont | NB | NS | PEI | Nfld | OVERALL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of legislators who *strongly* agreed that ... | | | | | | | | | | | |
| Most smokers are addicted to nicotine | 80 | 73 | 83 | 71 | 75 | 83 | 77 | 79 | 91 | 74 | 78 |
| Second-hand smoke can cause lung cancer | 60 | 53 | 61 | 54 | 58 | 71 | 64 | 62 | 41 | 50 | 59 |
| Proportion of legislators who said that ... | | | | | | | | | | | |
| It is *very* difficult for daily smokers to quit | 73 | 62 | 70 | 71 | 58 | 71 | 54 | 76 | 64 | 71 | 67 |
| Tobacco causes *a lot more* deaths compared to alcohol[a] | 40 | 40 | 24 | 29 | 31 | 43 | 41 | 26 | 14 | 26 | 33 |

[a] In 1992, there were 33,498 deaths among Canadians due to tobacco, compared to 6,701 deaths due to alcohol.[4]

**TABLE 5**

**Support for tobacco control policies, by jurisdiction (%), provincial and territorial legislators, Canada, 1996/97**

| | Terr | BC | Alta | Sask | Man | Ont | NB | NS | PEI | Nfld | OVERALL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Support for ... | | | | | | | | | | | |
| Regulation of tobacco as a hazardous product | 93 | 91 | 72 | 83 | 86 | 73 | 82 | 85 | 86 | 74 | 81 |
| Government regulation of cigarette advertising | 80 | 87 | 72 | 80 | 69 | 62 | 92 | 82 | 77 | 82 | 77 |
| Strong penalties for stores selling to minors[a] | 73 | 69 | 70 | 63 | 69 | 73 | 90 | 50 | 64 | 71 | 70 |
| Price increase of 50 cents to 1 dollar per pack | 83 | 60 | 63 | 68 | 64 | 58 | 74 | 71 | 55 | 62 | 65 |
| Ban on smoking in workplaces | 77 | 67 | 35 | 29 | 56 | 53 | 59 | 35 | 27 | 44 | 49 |
| Ban on cultural event sponsorship by tobacco companies | 43 | 53 | 33 | 51 | 56 | 42 | 38 | 59 | 36 | 35 | 45 |
| Holding manufacturers liable for smokers' suffering | 57 | 42 | 30 | 24 | 44 | 32 | 36 | 35 | 18 | 41 | 36 |
| Suing tobacco companies to recover health care costs | 60 | 40 | 24 | 29 | 36 | 35 | 26 | 35 | 18 | 29 | 33 |

[a] Second time convicted

*strongly* agreed that second-hand smoke can cause lung cancer in non-smokers (59% overall; ranging from 41% in PEI to 71% in Ontario) and a clear majority agreed that it is *very* difficult for daily smokers to quit (67% overall; ranging from 54% in New Brunswick to 76% in Nova Scotia). More than half of the legislators knew that tobacco causes more deaths among Canadians than does alcohol (including deaths caused by drinking and driving) [data not shown]. However, only one third knew that tobacco causes *a lot more* deaths than does alcohol (ranging from 14% in PEI to 43% in Ontario).

### *Support for Tobacco Control Measures*

Levels of support among legislators were determined for specific tobacco control policies as well (Table 5). Support was very high for the regulation of tobacco as a hazardous product (81% overall; ranging from 72% in Alberta to 93% in the Territories) and for government regulation of cigarette advertising (77% overall; ranging from 62% in Ontario to 92% in New Brunswick). Substantial support was expressed for strong penalties for stores convicted a second time of selling cigarettes to minors (70% overall; ranging from 50% in Nova Scotia to 90% in New Brunswick) and for a price increase of fifty cents to one dollar per cigarette package (65% overall; ranging from 55% in PEI to 83% in the Territories). Legislators were divided about equally across the country concerning a smoking ban in workplaces (49% overall; ranging from 27% in PEI to 77% in the Territories) and a ban on cultural event sponsorship by tobacco companies (45% overall; ranging from 33% in Alberta to 59% in Nova Scotia). There was little support from legislators in most jurisdictions for holding cigarette manufacturers liable for smokers' pain and suffering or for suing tobacco companies to recover health care costs attributable to smoking (36% and 33% overall, respectively).

## Discussion

These findings show widespread support among legislators from most provinces and the Territories for a range of tobacco control policies, such as the regulation of tobacco as a hazardous product, government regulation of cigarette advertising, strong penalties for stores convicted of selling cigarettes to minors and a price increase of fifty cents to one dollar on cigarette packages. Legislators reported mixed support for a smoking ban in workplaces and a ban on cultural event sponsorship by tobacco companies. All of the policy areas specified, with the exception of the regulation of tobacco as a hazardous product, are within the constitutional powers of the provinces and the Territories.

The results also indicate that a majority of legislators who completed the survey in each jurisdiction believe that their level of government has a major responsibility to implement programs and policies to reduce smoking among youth. Furthermore, although over half of all legislators believe that second-hand smoke can cause lung cancer, the

survey data show that more efforts are needed to make legislators fully aware of the magnitude of tobacco-related mortality in Canada.

Representatives from medical associations and non-profit health organizations appear well situated to fulfil this educational role. Substantial numbers of legislators indicated they did not have enough contact with these groups. A recent study of US legislators found that medical and non-profit health groups were considered credible sources for tobacco control lobbying.[7]

Our research is the first to quantitatively document provincial and territorial legislators' perceptions and attitudes regarding tobacco and tobacco control policies. Whereas the majority of MNAs from Quebec were not willing to participate in the study, legislators from all other jurisdictions (except Alberta) provided response rates of at least 60%, and five jurisdictions exceeded 70% response rates. The Canadian parliamentary system is characterized by a powerful cabinet and senior bureaucracy, reinforced by political party solidarity;[8] nevertheless, information on legislators' attitudes may prove useful in predicting their future behaviour, such as the position they might take in caucus. A recent follow-up study of legislators in one American state found that legislators' votes on a cigarette tax bill were consistent with their previously reported support for such a measure.[9]

Our future work will involve a multivariate examination of factors that may influence legislators' perceptions and attitudes toward tobacco and tobacco control measures, including such variables as political party, legislator characteristics and tobacco industry campaign contributions.[10] These analyses may help explain similarities and differences in legislators' attitudes across jurisdictions and provide a basis for the development of interventions in support of effective tobacco control measures in the legislative arena.

## Acknowledgements

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# *Workshop Report*

## National Initiative to Improve Cancer Survival Information

*Suzana Fraser and Kathy Clarke*

### Workshop Overview

This workshop (held June 19–20, 1997, in Ottawa, Ontario) brought together major stakeholders to establish a Canadian initiative to develop systematic collection of population-based information on cancer survival. The broad goals of the workshop were to delineate the current needs regarding such data and to recommend practical mechanisms to systematically generate this information. Three key areas for discussion were identified: collection of staging data, collection of treatment data and standardized approaches to analysis. Presentations (summarized below), designed to establish common ground for workshop discussions, provided background information on population-based collection mechanisms, data and methodology requirements for conducting meaningful cancer survival surveillance, and practical examples of using cancer survival information.

### History of National Initiative

In December 1995, the newly established Cancer Bureau Steering Committee of the Laboratory Centre for Disease Control (LCDC) formally recognized that existing population-based cancer survival information was sparse, thereby limiting effective monitoring of progress against cancer. The Committee recommended developing an initiative to provide such information and formed a planning group representing key stakeholder organizations. This planning group identified three priority areas for discussion (listed above) and proposed a stakeholder workshop to start building a cancer survival information initiative.

Concurrently, the Canadian Coalition on Cancer Surveillance (CCOCS) had evolved from recommendations made at a workshop of the National Cancer Institute of Canada (NCIC), "Surveillance Systems for Cancer Control in Canada" (November 1996; Kananaskis, Alberta). The mandate of this multi-stakeholder coalition (for which LCDC functions as secretariat) is to develop a comprehensive cancer surveillance system. One of the Coalition's five subgroups, the Patient Management Working Group, has been developing a patient management component of the surveillance system. Thus, the present workshop also provided an opportunity to advance the efforts of the Working Group by developing a systematic means to capture stage and treatment data on a population basis.

### Workshop Terms of Reference

Workshop participants agreed on these specific goals.

- To reach consensus on the most important uses and applications for cancer survival data, identifying barriers to collecting information and defining priority developmental needs, particularly those related to stage and treatment data and standardized methodology
- To identify, in breakout sessions on staging and treatment, potential patient management-related applications for stage and treatment data collected at the population level and barriers to data collection, providing recommendations to the CCOCS Patient Management Working Group regarding collection of selected data elements

### Presentation Summaries

***Survival of Cancer Patients: Basic Issues***
***The EUROCARE Study (European Cancer Registry-based Study of Survival and Care of Cancer Patients)***

**Arduino Verdecchia**
***Instituto Superiore di Sanita*** **(Rome, Italy)**

The EUROCARE project, the first pan-European study on survival in cancer patients, provided comparisons among 11 European countries by analyzing data on 80,000 cancer patients from 30 population-based cancer registries in a uniform framework. Major confounding factors (i.e. disease definition, date of diagnosis, proportion of death

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certificates only [DCO], follow-up procedures) were controlled by collecting data according to a common protocol. Statistical confounding factors (method of analysis, competing mortality, selection of cases with wrong or inconsistent data) were controlled by using appropriate methodology for estimating relative survival figures as well as criteria for analysis.

Differences among countries, and sex and age groups were considered for interpretation as real effects (i.e. possibly due to effective treatment, early diagnosis, management and follow-up of patients, etc.). As health care systems may vary from country to country in type, effectiveness and available resources, cancer patient survival can be regarded as an indicator of the health care system's effectiveness, and differences in cancer patient survival, as indicative of situations that could be improved.

Attempts to interpret levels and trends have been made both statistically and by ad hoc data collection within samples of patients in some registries. High-resolution studies on a sampling basis aim at characterizing differences in diagnostic and therapeutic standards or time-related improvements. Specific multivariate analyses have been performed to study differences expressed as relative risks, adjusted for age and period of diagnosis, and to study interactions between the main factors. Mixture models were proposed to distinguish between potentially cured patients and the proportion of patients bound to die from the disease. Based on this approach, the interpretation of differences is greatly improved. However, the interpretation of differences still remains the major goal for present and future work of the EUROCARE study.

Comparability of cancer statistics, including patient survival data, can be reached by adopting common protocols and a unified framework of analysis, as in the EUROCARE study. Comparing cancer statistics between European countries and the US is the goal of specific projects now in place. Worldwide comparability may be possible in the foreseeable future.

### *US Experience: Population-based Cancer Survival Monitoring*

**Lynn Gloeckler Ries**
**National Cancer Institute, Cancer Statistics Branch**

SEER (Surveillance, Epidemiology, and End Results) data cover about 9.5% of the US population, using both active and passive follow-up. Patient follow-up is generally the poorest for female patients under 20 years old, for whom marriage and high mobility impact on follow-up success. Data collected by SEER include patient demographics (age, sex, race, geographic location), primary tumour site and morphology, diagnostic methods, extent of disease (EOD) and first course of treatment.

Stage captured by EOD has been collected since the program's inception. The detail and amount of information vary somewhat over time; the data set currently includes size, extension of tumour and lymph nodes (involvement, number positive, number examined). The EOD scheme (localized, regional, distant) can be used for long-term trends of historical staging and can generally be converted to the TNM (tumour, node, metastasis) classification scheme of the American Joint Committee on Cancer (AJCC).

Often, extent-of-disease data yield a better evaluation of prognostic factors than stage alone. The interrelationship among survival, EOD (stage), treatment and demographic variables is complicated. Impacts of using both stage and treatment data to interpret survival must be considered carefully. Population-based treatment can be used to examine diffusion of therapy but should not be used to evaluate the efficacy of treatment, which is best left in the domain of clinical trials. In addition, SEER has implemented special studies for certain sites to collect information on treatment given in outpatient settings since routine methods tend to underreport these treatments.

Several published reports about survival have examined the effects of extent of disease and other factors on survival. Recent reports examine lung, ovarian and breast cancer survival. A study on breast cancer explored conditional survival, that is, survival subject to predetermined periods of post-diagnosis survival. The study shows that survival differences vary substantially according to post-diagnosis period and suggests this approach may be well suited to providing more precise prognostic data.

SEER data are available free of charge on CD-ROM and through Internet access. Both incidence data and a survival component are available, as is stage-specific survival according to AJCC staging standards. In addition, site-specific surgery (from 1983 onward) and radiation data are available.

### *Cancer Survival in Ontario: Population-based Survival Analysis*

**Margaret Sloan**
**Cancer Care Ontario (formerly Ontario Cancer Treatment and Research Foundation [OCTRF])**

This presentation focused on analyses published in *Cancer Survival in Ontario*,[1] a monograph publication of the OCTRF based on data from the Ontario Cancer Registry (OCR). Included were incident cancers diagnosed between January 1969 and December 1988, with outcome follow-up complete to December 1989. Relative survival rates by sex, age group and time period were tabulated for each of 25 site groups, as well as for all sites combined.

Ms Sloan highlighted some interesting results and discussed issues regarding data quality and completeness, some of which derive from the passive cancer registration procedures used by the OCR, and some of which are inherent in the original data sources. The most obvious limitation is the absence of staging data for a large portion of the tumours, in fact, for virtually all of the earlier cases.

Limitations related to the use of relative survival as the statistic of choice were discussed. These arise for the most part from the definition and calculation of expected survival. Because only population-based life tables are readily available, it is not possible to calculate relative survival for subgroups based on, for example, socio-economic status, ethnic or cultural background, or distribution of risk factors such as smoking.

### *Cancer Data Collection Systems in Canada: National Data Collection*

**Eric Holowaty**
**Cancer Care Ontario**

The current registry system in Canada provides a comprehensive means of reporting cancer incidence and mortality, envied by other nations for its national scope. Despite this accomplishment, the system has limited capacity for cancer control surveillance. The vision of the CCOCS to develop a surveillance system that extends current databases to include other relevant data elements such as staging is appropriate.

To become fully effective, the system will require concurrent development of standards and procedures to ensure compliance with standards for data collection. The development of such policies and procedures to ensure uniformity in data quality across registries is of paramount importance, particularly at a time when capture of new data elements is being discussed.

In Ontario, some of the current barriers to data quality include lag time between diagnosis and registration, lack of microscopic confirmation (for 15% of cases), loss to follow-up and missing data elements. Unexplained variations in regional incidence-to-mortality ratios indicate problems related to completeness of registration. In general, about 85% of the problems appear in 20% of the cases; thus, follow-back may resolve this to some extent. Reallocation of funds to target problem areas appears wise.

Currently, collection costs for data are approximately $25 per case.

**Andy Coldman**
**British Columbia Cancer Agency**

The BC Cancer Agency maintains the provincial cancer registry and an information database on all patients referred to the Agency for treatment or follow-up (about 60% of total). The registry includes basic demographic information (name, sex, date of birth, date of death, cause of death) and information on each cancer diagnosis (ICDO code, date of disease, address of diagnosis). The Agency's patient database contains further information on stage of disease, detailed radiotherapy treatment information and follow-up data. The primary source of cancer registration is the pathology report, and 75% of subjects are registered within three months of diagnosis. Within two years of diagnosis, 62% have been referred, 21% are deceased and 26% are alive and non-referred. Staging is available for 48% of all cancer diagnoses and in 91% of those referred to the BC Cancer Agency.

### *National Staging Initiative Report*

**Brian O'Sullivan**
**Canadian Committee on Cancer Staging**

Interest in the systematic application of cancer staging and collection of such data have existed for decades. Recently, however, efforts to develop a comprehensive strategy for collection and capture of such data have received support through a series of workshops, opinion surveys and committee deliberations. In particular, the Canadian Committee on Cancer Staging, a subcommittee of the Advisory Committee on Cancer Control of the NCIC, was given further support for the ongoing Consultation on Cancer Staging at the 1996 NCIC workshop on cancer surveillance systems.

The Consultation, involving leaders in oncology in the areas of administration, clinical research and cancer prevention, has culminated in a draft formulation of (i) an outline of the principles of cancer staging and its use; (ii) an assessment of the value of cancer staging for patient care, cancer program management and clinical/epidemiologic research; and (iii) recommendations about the use of staging for developing standards of care, training to enhance application and processes for capture, compilation and quality assurance in data handling.

**Draft recommendations**

- That the recording of TNM stage in medical records by the treating physician become a standard of care
- That consultation recommendations be submitted to the Association of Provincial Cancer Agencies and the Canadian Council for Health Services Accreditation (CCHSA)
- That CCHSA be requested to include TNM in the records of every cancer patient as a requirement for accreditation of cancer centres
- That national agencies, especially the NCIC, continue to play a lead role in processes involving education, training and facilitation of the National Cancer Staging Initiative
- That a quality assurance program be developed and co-ordinated to ensure quality and comparability of data gathered across jurisdictions

Other practical suggestions, enhancements or alternatives to these recommendations to strengthen and facilitate the consultation process and products would be welcome.

### *Lessons Learned in Implementing the Capture of Stage Information in a Regional Cancer Centre*

**Bill Evans**
**Ottawa Regional Cancer Centre**

It has been difficult to capture information on tumour stage in most acute-care institutions and regional cancer centres. Three years ago, the Ottawa Regional Cancer Centre (ORCC) initiated systematic capture of stage information on all newly diagnosed cancer patients. Many lessons were learned. First, leadership from an institution's administration (including the CEO and manager of health information services) is essential. In the case of the ORCC, additional commitment came from the physician head of the Health Records Committee and discipline heads. This ensured that the process worked effectively. Previous attempts to capture stage information, which were not fully embraced locally, have failed.

Institutions attempting to capture stage information will receive multiple excuses for non-compliance. Physicians usually indicate that they already stage patients in order to determine appropriate care, but this information is not captured in a consistent fashion to allow for recording in information systems. Physicians tend to resist requirements to complete more forms and may see the process as an administrative exercise. Some claim that collection has little value because staging systems continually evolve and may be replaced by non-anatomical prognostic indicators, such as biomarkers. Others argue that stage is only one of several important prognostic factors, and they may be reluctant to capture any if it is not possible to capture them all.

The ORCC process moved quickly once the organization clearly established its intent to capture stage information by introducing a policy requiring all new patients to be staged using the TMN classification. The policy stipulated that medical staff comply as a condition of their employment under the Centre's Medical Staff By-laws. Physicians were engaged in providing input for the process of capturing stage and the design of the staging forms. Forms were developed using desktop publishing and modelled after the AJCC staging forms.

The ORCC Medical Advisory Committee's recommendation that staging forms be completed within three months required a system to flag incomplete charts. Non-compliance was reported to the individual physician and, subsequently, to the discipline head. The initial six months were difficult and demanding for Health Information Services staff, who had to follow up on many incomplete records. Gradually, compliance improved and physicians began using stage information for research purposes and program planning.

Eventually, stage progression had to be addressed, an issue particularly problematic for patients referred to the Centre long after their original diagnosis. From a cancer surveillance perspective, capturing the original tumour stage is important; however, physicians need current stage information for treatment decisions. Thus, the staging forms were modified to capture both, and the policy was modified accordingly.

The ORCC experience reveals that staging principles should be defined clearly in the policy on staging. Not all physicians know how to stage; therefore, training may be needed. Finally, audit of the data is essential to determine data quality.

The Centre uses stage information to do retrospective chart reviews, to estimate the number of patients available for new studies, to define the Centre's clients for accreditation purposes, to facilitate clinic scheduling decisions, to target academic detailing to the counties in the Centre's catchment area and to estimate new drug usage and cost. Staff are still learning how to optimally display and use the available stage information. Questions arise as to what data to display, who should receive data and how often data should be summarized. The numerous purposes for which the data have already been used more than justify the Centre's effort to implement stage capture. The availability of these data provides new opportunities to be creative in educational initiatives, research studies and Centre management.

### *Barriers to Using Registry Data to Evaluate the Outcomes of Cancer Treatment*

**Bill MacKillop**
**Kingston Regional Cancer Centre**

Through the experience of collecting cancer treatment and outcome data in Ontario over the past four years, the following limitations have been identified: lack of information about the quality of collected data and insufficient data on patients' prognostic characteristics (e.g. stage at diagnosis, comorbidity, functional status) and even on the specific treatment outcomes of primary interest (e.g. definitive outcomes such as death or recurrence vs more time-dependent, subjective outcomes such as quality of life or patient satisfaction with treatment symptom control).

Currently, treatment data are not collected at the Ontario Cancer Registry level. However, various details of treatment are routinely recorded at time of care, and thus linkage to Registry-based (outcome) data can occur. Depending on the treatment data in question, this linkage may involve either primary or secondary data capture. One problem in capturing treatment data is that they may be collected through disease-based rather than person-based mechanisms, thus precluding linkage with other patient data (e.g. prescription data for hormone therapy).

The need for population-based collection of treatment data is underscored by the findings of two recent studies.[2,3] These studies linked radiotherapy data (collected from Ontario's cancer centres) to individual patient records at the Registry level and ascertained waiting periods for treatment. Access to radiotherapy treatment varied substantively across Ontario jurisdictions, and treatment

delivery rates were lower and involved longer waiting periods than in the US. These results affirm that the system delivery of radiotherapy in Ontario does not provide equitable access or treatment within medically acceptable time lines. Such studies illustrate the utility of collecting treatment data, in that these data can be applied to care management and can provide indicators to assess the cost and quality of delivery.

Along with developing a systematic, comprehensive means of collecting treatment data, it is important to emphasize collecting a broader spectrum of outcome data, for instance, the effect on quality of life over time, considering both curative treatments and palliative treatments for alleviating discomfort. More information about both hospital and home care (i.e. support and continuing care) is also required for effective surveillance of treatment delivery in Canada.

In summary, the capture and recording of treatment information seems to be adequate; the problem arises in transferring this information to registries and users. Until adequate linking systems are developed, the information is available but not accessible.

### *Methodology: Cancer Survival Analysis Methods and Applications*

**Timo Hakulinen**
**Finnish Cancer Registry, and**
**Dept of Public Health, University of Helsinki**

Observed survival rates of cancer patients can be obtained by using the life table method or the Kaplan-Meier method. The latter utilizes individual exact observation times, whereas the former considers these times in groups, for instance, by year or month of follow-up. However, observed survival rates give an incomplete, pessimistic picture of cancer patients' survival because various non-cancer causes of death contribute to lower rates. Moreover, the rates are not comparable as such between young and old patient groups since older patients have an increased mortality due to non-cancer competing risks of death.

One way to correct for competing risk mortality is to regard all the deaths due to competing risks as censoring events for the patients' observation times. The corrected or cause-specific survival rates derived in this way presuppose knowledge of individual patients' causes of death. This information can be unavailable or unreliable.[4,5]

The second way of correcting for competing risk mortality is to compare the patients' mortality with that of a general population group, considered practically disease-free, with respect to important demographic factors such as sex, age and calendar time.[6] Then the excess mortality of the patients is used to generate relative survival rates that describe patient survival under cancer-associated excess mortality only.

Specialized software packages[7–9] can calculate the relative survival rates and take into account important prognostic factors related to the patient and the tumour. The methods used may be viewed as generalizations of the Cox proportional hazards model and are particularly suited for non-proportional hazards. Non-proportionality of the mortality and the patients' excess mortality is more the rule than the exception as the importance of prognostic factors determining the patients' survival changes over time. For example, the stage is typically a determinant of early survival and its importance is practically non-existent after a few years of follow-up after diagnosis.

Routine publications on survival analysis in the US and many other countries, and the European EUROCARE collection have been produced using relative survival rates.[10–12] A further interesting application has been the use of patients' residence and social class as a determinant for the specific general population group, thereby making it possible to study the equity of cancer patient survival related to place of residence and social class. For example, an analysis of 12 common sites in the Nordic countries showed that about 2–3% of all excess deaths of these patients were associated with residence (Nordic countries) or social class (only Finland studied).[13]

## Breakout Sessions and Discussion

**Current and potential uses for cancer survival information and barriers to producing national data**

Uses for cancer survival information

- "Comparisons" (i.e. surveillance of local, regional, international and temporal survival experiences)
- Private, public and business planning (e.g. data for policy decisions such as resources planning, health delivery for target population subgroups)
- Evidence-based decision making (e.g. decisions about targeted treatment, support for clinical decisions)
- Assessment of impact of cancer control programs (prevention, screening and treatment) on cancer survival

Barriers to producing cancer survival data at national level

- Variation in quality of data currently collected at regional level (e.g. frequency of death clearance)
- Lack of standardization of terminology and definitions
- Lack of data elements required to produce meaningful cancer survival information (e.g. absence of stage at diagnosis and initial treatment limits interpretation of differences across regions or time)

### *Capturing Stage Data Nationally*

The mandate of the Canadian Coalition on Cancer Surveillance (CCOCS) expresses the ultimate goal of a system that captures all relevant data required to monitor the efforts and impact of cancer control. The existing surveillance system, limited to incidence and mortality data, is insufficient for this task. Ideally, an expanded

system would include information on stage or extent of disease at diagnosis; initial and follow-up treatment; patient characteristics (e.g. sociodemographic); access to treatment and detection programs, care and support; and quality of outpatient or palliative care. Such a system, flexible and evolving according to needs, would take extensive effort to develop.

Some components of such an ideal system are already in the developmental stages. As described in the presentation summaries, the national initiative to collect staging data for surveillance purposes is well under way. The majority of the practical steps and issues for this data collection identified by the Workshop breakout groups are already being considered by the Canadian Committee on Cancer Staging (CCCS). These discussion points (outlined below) will benefit future efforts to collect other data that may be needed within the comprehensive cancer surveillance system envisioned by the CCOCS.

**Purpose of collecting stage data**

Staging data is essential for interpreting trends in cancer survival, specifically to discriminate between the effects of various determinants of cancer survival (e.g. treatment, screening programs, age of the population, period of diagnosis). These data complement clinical trial data, currently the only means to properly evaluate cancer patients' survival, but generalizable only to highly select populations. At the patient level, optimum care is feasible only with proper staging. Thus, patient stage data benefit both immediate (direct patient care) and long-term (subsequent patient care guided by population data) decision making.

**Leadership**

The CCOCS can provide national leadership to guide the system development process by identifying sources of financial support, quality assurance methods and standards, and guidelines for access to a national database, for data analysis and for use of outcome information. Methods and standards developed by the North American Association of Cancer Registries could be adapted to the Canadian setting. Access to the database should be universal, portable and comprehensive, but with safeguards to protect the confidentiality of data and integrity of results.

**Administrative support**

Discussion is under way to include stage data as part of the minimum data requirements for CCHSA accreditation standards for cancer treatment institutions. Senior administrators can help ensure quality reporting through policies or by-laws stating, for example, that pathology reports be released only with clinical staging or that no fees be recovered without completed forms. The Royal College of Physicians and Surgeons can educate members about guidelines and processes for staging. Endorsement by the cancer agencies will further support the reporting of staging information.

**Lines of responsibility for data collection**

Clear lines of responsibility and accountability will ensure effective, standardized collection of staging (and treatment) information. Guidelines should clarify who owns, assembles and manages the data and when data collection should take place, i.e. with the pathology report or upon discharge. A framework or a system to enhance current reporting would need the co-operation of clinicians and pathologists to support mechanisms ensuring standardized and timely data collection.

**Management tools and mechanisms**

Hospitals will need standardized forms, training, policies and procedures, to be developed centrally. In addition, standardized software will be required for management, editing, conversion, record reconciliation and validation. A management group including practitioners should be responsible for setting benchmarks for data collection and developing standards for determining who can access the summary data. Strategies to safeguard personal data will need to be developed to include checks and balances and legislative safeguards of privacy (e.g. release of aggregate data only).

Electronic reporting would ideally be incorporated within the existing systems (e.g. provincial cancer registries, Statistics Canada, Canadian Institute for Health Information). The data may not need to reside in one location: a "virtual" system of data collections may be feasible. However, reporting from multiple sources will require methods for resolution of multiple TNM codes at some level.

**Implementation options for collecting stage (or other) data**

- Phasing in, by geographic area, or beginning with the formal system and extending to the informal system. Alternatively, comprehensive collection of data can be initiated.
- A sampling approach, collecting only selected cancers. This option is useful when extensive and detailed information is required. For instance, stage at diagnosis, means of determining stage and (at least) initial treatment data would be required to evaluate the effect of screening on survival.

**Promotion of uses for data set**

Although much data collection already occurs, it is not always clear who the users are and how they can utilize the data. Clients, including patients, advocacy groups, care providers, researchers and policy planners, may not know what data are available or how they can be used. To maximize use, applications for the data elements now available and potential ones (i.e. stage) should be demonstrated and promoted to appropriate users.

Consolidation and publication of current regional and provincial systems could provide concrete evidence of the utility of data collection to physicians, underlining the

usefulness of an expanded national cancer surveillance system. On the other hand, the limitations of analyses without stage data in existing reports on cancer survival status should be highlighted to encourage reporting of stage data. CCOCS recommendations for additional surveillance system core data collection should be published.

Provincial offices or regional cancer centres should be approached to form an "agency of chairs" or to recommend "champions" to identify potential users and to promote data reporting. Various strategies would increase interest in collecting the data and encourage compliance in reporting: oncology groups could encourage education and physician compliance; workshops for cancer centre teams and pathologists could promote the usefulness of value-added data to those involved in collecting and managing the information; a process could be promoted to provide useful and timely information back to practitioners and registries; and a business plan could describe the usefulness of value-added information.

### Funding

There are no technological barriers to collecting additional data; however, funding for collection and reporting of cancer data is largely decentralized. A national system of data collection would require reconciliation of data from multiple sources, edits and quality checks, thereby adding to registry workloads. Registry collaboration will thus be required both to ensure data quality and to lobby for sufficient funding to support health records and systems development.

When seeking funding, it should be emphasized that the costs of data collection and management are minimal compared to the costs of treatment. Further, stage or treatment data are useful in monitoring the efficacy of control programs and in other cost-benefit evaluations.

### *Capturing Treatment-related Data*

Many of the considerations for collecting population-based stage data also apply to treatment data. The applications for population-based treatment-related data, as for stage data, extend beyond cancer survival surveillance, for instance, to examining patient access to optimal care.

Cancer survival surveillance that includes population-based treatment data will enhance the ability to interpret survival patterns observed. Only summary data (e.g. whether surgery, chemotherapy or radiation therapy was used in initial treatment, whether stage was diagnosed at surgery) would be required; more detailed treatment data (e.g. chemotherapy dosages, radiation fractions used) are more appropriate for use in clinical trials.

Population-based collection of treatment data may also be useful in the following patient management surveillance applications.

- Examining differential access to care by region and effectiveness of resource allocation by region and province
- Assessing the impact of centralization and rationalization of services
- Assessing quality of care and treatment decisions, e.g. modality, drugs used. For quality of surgery, some surrogates may be necessary, e.g. length of stay, post-operative mortality.
- Examining treatment-related complications
- Assessing outcomes to help management decisions, i.e. treatment as an outcome. For instance, is the goal to preserve the organ or survival alone?
- Planning for health care services
- Providing aggregate data for costing and cost-effectiveness of care strategies
- Monitoring compliance with practice guidelines

Barriers to capturing treatment data are similar to those for stage data. A standardized system for data collection; mechanisms to monitor data quality; compliance with reporting guidelines; and, above all, the administrative will to initiate and maintain collection will address these barriers.

Data capture options could be initiated by a sampling or population-based approach, or a mix of both. A proposed core data set for treatment and treatment-related information is provided as the Appendix.

### *Analyses, Methodology and Applications for Cancer Survival Surveillance*

The following strategies will facilitate cancer survival surveillance at a national level.

### Analytic considerations

Given the diversity of resources, data and data quality across registries, the most appropriate way to conduct large-scale population-based survival analyses is to establish an expert working group comprising representatives from the provincial cancer registries and LCDC. The Cancer Bureau of LCDC should facilitate this group’s formation and initiate efforts to produce a national report. International experts should be consulted in the initial phases of the working group’s efforts.

The working group’s mandate should include specifying methodology and computer application tools to be used and defining minimum data standard inclusion criteria. A basic national descriptive report should include national and provincial survival experiences (as available) by site, sex, age group and calendar period. Subsequent reports could focus on targeted projects such as explanation of regional discrepancies and impact of socio-economic status on cancer survival.

Although information on cancer stage and treatment would greatly facilitate the interpretation of population-based survival analyses, the process for capturing these data at a population level is anticipated to take some time. A national report should be prepared without delay to document the differences in survival across regions. Future work can provide more in-depth analyses and interpretation of discrepancies in outcomes once supplementary data on stage and treatment are available. Cancer survival reports should be prepared periodically.

**Data considerations**

It is absolutely essential that a national death clearance be conducted on all Canadian data from 1969 on. Although the death clearance is now performed in some provinces, there is no national death clearance mechanism (to identify deaths in provinces other than the province in which the cancer was diagnosed). Further, death clearance has not been conducted for an extended period in several provinces, and this has precluded even cursory monitoring of cancer survival among these populations. National death clearance, after completion of clearance of 1969-to-current data, should be systematic and periodic (at intervals to be recommended by the working group).

Workshop participants with expertise in analysis strongly endorsed efforts to collect stage and treatment data on a population basis and identified additional data elements for cancer survival monitoring. Priorities identified included ethnicity and socio-economic status (SES). Although it is feasible to use aggregate SES data for ecological level analyses, individual data are preferable.

The Workshop group strongly endorsed continued attention to quality assurance processes.

## Summary

Mechanisms and technology already exist to collect survival data nationally. The major challenge is to develop the will and collaboration of those responsible to ensure the completeness, quality and timeliness of data. Administrative willpower is the key to success.

To develop systematic national data collection, several key challenges must be addressed.

- Software and linkage mechanisms, to be developed nationally
- Methods and channels of transmission (real or "virtual" database)
- Co-operation of clinicians, pathologists, hospital administrators, tumour boards and registries
- Funding for extra workload to consolidate data
- Cancer not currently reportable in all provinces


## Acknowledgements

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* Speakers
** Also Co-chairs ■

## APPENDIX

### Proposed minimum national core data set for treatment and treatment-related information

| Data elements | Minimum core element | Currently available |
|---|---|---|
| **SURGERY** | | |
| Site/histology | Y | Y |
| Stage | Y | N |
| Margins | Y | ± |
| Operation | Y | Y |
| Type | Y | Y |
| Intent | O | N |
| Hospital | Y | Y |
| Date | Y | Y |
| Site of first relapse | O | N |
| **RADIOTHERAPY** | | |
| Site/histology | Y | Y |
| Stage | Y | N |
| Dose (total given) | Y | Y |
| Fractions and number of fields | Y | Y |
| Start date | Y | Y |
| Finish date | Y | Y |
| Radiotherapy type (treatment modality) | Y | Y |
| Intent (curative/palliative) | Y | Y |
| Treatment centre | Y | Y |
| Site of first relapse | O | N |
| **CHEMOTHERAPY** | | |
| Site | Y | Y |
| Stage | Y | N |
| Date of administration | Y | N |
| Chemotherapy (yes/no) | Y | N |
| Adjuvant (curative/palliative) | O | N |
| Date first course | Y | N |
| Drugs (first course) | Y | N |
| Intravenous | Y | N |
| Oral | O | N |
| Supportive care drugs | O | N |
| Biological response modifiers | O | N |
| Hormones | O | N |
| Complications | | |
| Febrile neutropenia | O | Y |
| Hospitalization | O | Y |
| Vital status (date) | Y | Y |

Y = Yes
O = Optional for now. Desired in data set but not easily achievable.
N = No
± = Sometimes available

# *Status Report*

## New Research Initiatives from the Child Maltreatment Division

*Gordon Phaneuf and Lil Tonmyr*

### The Canadian Incidence Study of Reported Child Abuse and Neglect

An unknown number of Canadian children and youths are victims of abuse and neglect. As a first step to a better understanding of the nature and extent of the situation in Canada, the Child Maltreatment Division of the Bureau of Reproductive and Child Health at Health Canada's Laboratory Centre for Disease Control is developing a national incidence study of child abuse and neglect. Information will be gathered from participating provincial and territorial child welfare agencies across Canada through the Canadian Incidence Study of Reported Child Abuse and Neglect (CIS).

The study addresses physical, sexual and emotional abuse as well as neglect. A standard data collection tool is being developed that will be completed by child welfare workers on reported cases of child abuse and neglect.

#### *Objectives*

- To provide national estimates on the incidence of reported child abuse and neglect
- To develop baseline information on the reporting of abuse and neglect and to monitor trends
- To improve our understanding of the forms and severity of abuse
- To assist in the targeting of resources for children at risk of abuse
- To collect information to help develop programs and policies for children and youths at risk

#### *Scope*

The study will focus on cases of child abuse and neglect that have been identified by or reported to child welfare agencies. Therefore, estimates of the number of cases of abuse and neglect gathered in this study will not include unreported cases.

#### *Uses for Resulting Information*

- To increase public awareness
- To inform professional practice
- To strengthen understanding and knowledge
- To identify areas of research
- To set priorities for prevention and intervention

#### *Participants*

The University of Toronto, awarded a three-year contract to undertake the data collection and analysis, is leading a national project team of child abuse experts in developing the study.

The study is based on close working relationships with provincial and territorial governments, Aboriginal organizations and non-governmental organizations.

A multidisciplinary national advisory committee has been created to provide advice on the study's development. Many fields of expertise are represented on the committee, including public health, child advocacy, child welfare, children's mental health, social services and criminal justice.

### Child Abuse Reporting and Classification Project

The Child Maltreatment Division is also supporting research identifying how child abuse is classified and reported in pediatric hospital settings.

There are three components to the project: a survey to be conducted in selected pediatric hospitals in Canada, a literature review of reporting in Canada as well as in other jurisdictions and a review of current Canadian legislation and case law regarding mandatory reporting of child abuse.

***Author References***

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### *Objectives*

- To provide a national overview of the identification, classification and reporting of child abuse in selected hospitals
- To examine current legislation and case law on mandatory reporting of child abuse in Canada
- To review the literature on child abuse reporting practices, scope and definitions, and discuss issues related to identification and classification of child abuse in hospital settings

### *Scope*

The information will be collected from several pediatric hospitals in Canadian cities, including Vancouver, Calgary, Winnipeg, Toronto, Hamilton, Ottawa, Montreal and Halifax.

### *Uses for Resulting Information*

- To improve the identification and classification of child abuse
- To identify training requirements for professionals in hospital settings
- To clarify issues regarding confidentiality, underreporting, liabilities for non-reporting and reporting biases
- To facilitate agreement on definitions of child abuse

### *Project Team*

The Canadian Research Institute for Law and the Family (CRILF) is collecting the information, under the leadership of Joseph P Hornick (Executive Director, CRILF). Stanley Loo is the Social Service Consultant; Nicholas Bala (Queen's University), the Legal Consultant; and Margaret Clarke (Alberta Children's Hospital), the Pediatric Consultant. ■

# *Book Reviews*

## Epidemiology and Health Services

***Edited by Haroutune K Armenian and Sam Shapiro***
*New York: Oxford University Press, 1998;*
*ISBN 0-19-509359-3; $55.95 (CAN)*

This is an introductory textbook of epidemiologic methods, oriented specifically toward health services research. Six of its twelve chapters are written by its eminent editors, and all but one of the remainder by their colleagues at the Johns Hopkins University. Three introductory chapters provide a framework for action, based on problem investigation, problem solving and program development. The remaining nine chapters deal with various epidemiologic tools, ranging from management information through public health surveillance and various analytical study designs, as well as a good chapter on analytical approaches and an outstanding one on meta-analysis ("possibly the most important policy-related research method that has developed in the past two decades"). A few chapters include exercises (with answers) and discussion questions.

The book provides a good overview of the contribution of epidemiology to health services research, but it is very short on details. I find the writing in several chapters to be somewhat opaque. The authors avoid conventional epidemiologic terminology (the term *relative risk* appears only briefly, *attributable risk* or *fraction* hardly at all). The descriptions of epidemiologic concepts are so elementary that they could not prepare the beginner to do very much; for example, one could never do a case-control study after reading the chapter on that topic, although the later treatment of the same topic in the analytical chapter would help.

On the other hand, the book fails to treat some topics that are clearly relevant to health services research, such as measuring utilization and relating it to concepts of risk and rate, and there is not much on the interface with economics (e.g. quality-adjusted life years [QALYs]). A surprising proportion of the examples are not drawn from health services research (unless one defines that field very broadly indeed).

In addition, the book contains a few questionable technical points, such as the discussion of sensitivity and specificity in the context of precision (which I think of as relevant to reliability, while validity seems more relevant here) or the suggestion that *attributable risk* (actually *population-attributable fraction*) can be extracted from a case-control study (surely one needs to use external evidence as well).

| | |
|---|---|
| *Overall Rating:* | Fair |
| *Strengths:* | Oriented specifically to health services research<br>Excellent chapter on meta-analysis |
| *Weaknesses:* | Does not provide a very thorough background in general epidemiology<br>Does not address specific key issues like how to measure utilization or access |
| Audience: | Non-epidemiologists interested in collaborating with epidemiologists in health services research |

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## European Community Atlas of 'Avoidable Death' 1985–89

***By W W Holland and the EC Working Group on Health Services and 'Avoidable Deaths'***
*Oxford: Oxford University Press, 1997; Commission of the European Communities, Health Services Research Series No 9; ISBN 0 19 262844 5; $321.95 (CAN)*

This atlas addresses several aspects of health care that are receiving attention in Canada; among these are the evaluation of geographical variations in health service and the emphasis on health outcomes. As the editors describe in the brief introduction, avoidable deaths have been proposed as a "practical and inexpensive" outcome measure for health services. Counting unnecessary and untimely deaths is a broad performance indicator for the provision of service for the entire health care system, from prevention to cure and care.

The main body of the Atlas is 18 impressive double-page, oversized colour maps of different conditions or avoidable deaths for the 12 European Community (EC)

countries. One page depicts standardized mortality estimates for the diseases, mapped by region, and the facing page displays the corresponding time trends. Included with the maps are histograms of standardized mortality ratio (SMR) ranges, with the frequency of areas in each range, and statistical "safety" bars indicating caution when interpreting estimates with small numbers. Smaller black and white plates follow, focusing on variations within individual countries.

Mapped causes of death include cervical, uterine and breast cancer, Hodgkin's disease, chronic rheumatic heart disease, all respiratory diseases, asthma, tuberculosis, appendicitis, abdominal hernia, cholelithiasis and cholecystitis, hypertensive and cerebrovascular disease, maternal and perinatal mortality, peptic ulcers and all-cause mortality. For each condition there are age ranges corresponding to a preventable period.

The Atlas is the third edition prepared by the EC Working Group. This edition generally follows the same approach as the previous versions. Mortality is updated for the years 1985 to 1989 and time trends are compared to estimates from the previous edition (1980–1984). The greatest improvement is in the presentation of histograms and statistical variance of SMR estimates in the colour maps. The text of each chapter appears in three of the EC languages, making the Atlas accessible to both French- and English-speaking Canadians (the third language is German).

Overall, the Working Group has created a remarkably clear and comprehensive presentation of meaningful health service outcomes. Having said this, I found the interpretation of results lacking. I was fascinated by the large regional variation for many of the conditions (in many instances exceeding a 20-fold range) and distinct geographic patterns (e.g. high asthma mortality in Great Britain), but as a reader from outside Europe, I found it difficult to understand why differences or changes occurred. The text offered little help in this regard other than brief one-page updates on the studies from the individual countries.

To defend the Working Group, they clearly stated that one objective was not to explain the levels of variation, but to motivate further research at the small area level. In this third edition, however, I was left with the impression that many countries had few follow-up studies of the variations observed in the previous two editions of the Atlas. If this is true, the absence of follow-up would reflect on the impact of such atlases to motivate improvement in health and health care, an important objective of the authors. If there *are* more studies, I think non-Europeans especially would benefit from an expansion of the chapter on interpretation of the maps and from a larger bibliography.

The greatest contribution the Atlas makes for non-Europeans is not the specific content, but the concept, methods and presentation. Canadian researchers and health planners involved in evaluation of the health care system will find the approach used by the EC Working Group to be very thorough and applicable to Canada. It would be fascinating to extend the Atlas to include other countries with well-developed health care systems and mortality registries (such as Canada, the United States, New Zealand and Australia).

All in all, the Atlas is a useful reference book for health planners and epidemiologists. I see it becoming a valuable reference in the collection of larger libraries.

| | |
|---|---|
| *Overall Rating*: | Very good |
| *Strengths*: | Thorough analysis<br>Excellent data presentation |
| *Weaknesses*: | Restricted perspective; most useful for a European audience |
| *Audience*: | Health planners and epidemiologists with an interest in health service evaluation |

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# *New Publications*

## Measuring Stress: A Guide for Health and Social Scientists

***Edited by S Cohen, RC Kessler and LG Gordon***
*Canadian Contributors: RJ Turner and B Wheaton (Dept of Sociology, University of Toronto)*
*Oxford University Press, 1997; 256 pp;*
*ISBN 19-5121201; $37.50 (CAN)*

*Measuring Stress* is the definitive resource for health and social scientists interested in assessing stress in humans. With contributions from leading experts, this work provides for the first time a unified conceptual overview of the intricate relationship between stress and a variety of disorders. Its interdisciplinary approach to the selection of appropriate environmental, psychological and biological measures includes comprehensive evaluations and practical advice regarding a wide range of measurement approaches. For environmental stress, techniques such as checklists and interviews that measure life event, daily event and chronic stress are discussed. An analysis of psychological measurements includes methods for assessing stress appraisal and affective response. Neuroendocrine, cardiovascular and immune measures are examined as important biological stress assessments. Contributors also uncover the conceptual underpinnings of each approach as well as the various costs and benefits of available assessment techniques. Reflecting the diversity of theoretical conceptions of stress, *Measuring Stress* provides integrative, incisive guidelines that will prove invaluable to students, clinicians and researchers in health and social psychology, medicine, nursing, epidemiology, sociology and psychiatry.

## IARC Handbooks of Cancer Prevention: Volume 1: Non-Steroidal Anti-Inflammatory Drugs

***Edited by the IARC Working Group on the Evaluation of Cancer Preventive Agents***
*Canadian Contributor: A Castonguay (Laboratory of Cancer Etiology and Chemoprevention, Laval University)*
*Oxford University Press, 1998; 202 pp;*
*ISBN 9283230019; $121.50 (CAN)*

This handbook summarizes and evaluates the evidence for cancer preventive activity of aspirin and aspirin-like drugs. In addition, it summarizes other beneficial effects (anti-thrombotic effects in cardiovascular disease prevention) and adverse effects (gastrointestinal bleeding, adverse renal and hepatic effects) of aspirin and aspirin-like drugs.

## Essentials of Human Nutrition

***Edited by J Mann and S Truswell***
*Canadian Contributors: EM Johnston (School of Nutrition and Food Science, Acadia University), D Secker (Hospital for Sick Children, Toronto), W Woodward (Dept of Human Biology, University of Guelph) and SH Zlotkin (Dept of Paediatrics, University of Toronto)*
*Oxford University Press, 1998; 480 pp;*
*ISBN 19-2627562, Paper: $80.95 (CAN);*
*ISBN 19-2627570, Cloth: $160.95 (CAN)*

The consequences of inappropriate human nutrition are among the major causes of ill health and premature death throughout the world. Appropriate nutrition is essential for normal growth and development and optimum human performance, and it has been identified as a major factor in the prevention of many forms of cancer. *Essentials of Human Nutrition* provides a broad-based introduction to the field of human nutrition, aimed at undergraduate students embarking on courses in nutrition and at medical students, doctors and other health professionals who require a basic understanding of the subject. While providing the basics of human nutrition, the book discusses some of the most important applied and clinical topics in the field today, including a number of fascinating case studies. Extensively illustrated, and fully comprehensive, the book provides the ideal text for anyone requiring a good all-round introduction to this important field.

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# *Abstract Reprints*

## 1. Smoking in the home: changing attitudes and current practices

*Mary Jane Ashley, Joanna Cohen, Roberta Ferrence, Shelley Bull, Susan Bondy, Blake Poland, Linda Pederson*
***Am J Public Health** 1998;88(5):797–800*

*Objectives.* Trends in attitudes and current practices concerning smoking in the home were examined.

*Methods.* Data from population-based surveys of adults in Ontario, Canada, were analyzed.

*Results.* Between 1992 and 1996, the percentage of respondents who agreed that parents spending time at home with small children should not smoke increased from 51% to 70%. In 1996, 34% of the homes surveyed were smoke-free. Smoke-free homes were associated with nonsmoking respondents and with the presence of children and no daily smokers in the home. Only 20% of homes with children and any daily smokers were smoke-free.

*Conclusion.* Efforts are needed to assist parents in reducing children's exposure to environmental tobacco smoke in the home.

## 2. Survival in cancer of the cervix: treatment in a population-based cancer registry in a developing country (Bangalore, India)

*Kumaraswamy, Ambakumar Nandakumar, Thalagavadi Venugopal, Nanjundappa Viswanathan*
***Cancer Causes Control** 1998;9(1):117–23*

A survival analysis of treated cases of cervix cancer that were registered in the Bangalore (India) Population Based Cancer Registry between 1 January 1987 and 31 December 1989 was performed. Information on vital status of patients was obtained principally through follow-up visits to homes of patients. Follow-up information was available for 860 (92.7 percent) of 928 registered cases. Of the 860 cases, information on treatment was available for 559 patients, on whom the analysis of treatment outcome was performed. The overall five-year observed survival (5YS) was 41.1 percent with a relative survival of 46.3 percent. The 5YS was significantly ($P = 0.01$) influenced by clinical stage and by addition of brachytherapy (BT) to external radiotherapy (EXT) (5YS = 60.1 percent *cf* 27.4 percent, $P \leq 0.001$). In 343 patients who received EXT only, comparatively better survival was seen in the group who had received between 4,800 to 5,999 centigray (cGy) (5YS = 36.1 percent) when compared with those who received less than 3,000 and 3,000 to 4,799 cGy (5YS = 16.7 percent and 24.9 percent, respectively). Doses of EXT higher than 5,999 cGy (in patients who were not suitable for BT) did not have any benefit in the 5YS (27.4 percent). The study has generated a specific hypothesis about possible needless excess dose of external radiotherapy.

## 3. Prostate cancer and supplementation with α-tocopherol and β-carotene: incidence and mortality in a controlled trial

*Olli P Heinonen, Demetrius Albanes, Jarmo Virtamo, Philip R Taylor, Jussi K Huttunen, Anne M Hartman, et al.*
***J Natl Cancer Inst** 1998;90(6):440–6*

*Background:* Epidemiologic studies have suggested that vitamin E and β-carotene may each influence the development of prostate cancer. In the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study, a controlled trial, we studied the effect of α-tocopherol (a form of vitamin E) and β-carotene supplementation, separately or together, on prostate cancer in male smokers.

*Methods:* A total of 29 133 male smokers aged 50–69 years from southwestern Finland were randomly assigned to receive α-tocopherol (50 mg), β-carotene (20 mg), both agents, or placebo daily for 5–8 years (median, 6.1 years). The supplementation effects were estimated by a proportional hazards model, and two-sided *P* values were calculated.

*Results:* We found 246 new cases of and 62 deaths from prostate cancer during the follow-up period. A 32% decrease (95% confidence interval [CI] = -47% to -12%) in the incidence of prostate cancer was observed among the subjects receiving α-tocopherol (n = 14 564) compared with those not receiving it (n = 14 569). The reduction was evident in clinical prostate cancer but not in latent cancer. Mortality from prostate cancer was 41% lower (95% CI = -65% to -1%) among men receiving α-tocopherol. Among subjects receiving β-carotene (n = 14 560), prostate cancer incidence was 23% higher (95% CI = -4% to -59%) and mortality was 15% higher (95% CI = -30% to -89%) compared with those not receiving it (n = 14 573). Neither agent had any effect on the time interval between diagnosis and death.

*Conclusions:* Long-term supplementation with α-tocopherol substantially reduced prostate cancer incidence and mortality in male smokers. Other controlled trials are required to confirm the findings.

## 4. Occupational exposures and gastric cancer

*Marie-Élise Parent, Jack Siemiatycki, Lin Fritschi*
***Epidemiology** 1998;9(1):48–55*

The role of occupational substances as stomach carcinogens has not been well investigated. In 1979, a population-based case-control study was undertaken in Montreal to explore the possible association between hundreds of occupational circumstances and several cancer sites, including the stomach. In total, 250 male patients with pathologically confirmed stomach cancer, 2,289 male controls with cancers at other sites, and 533 population-based male controls were interviewed to obtain detailed job histories and relevant data on potential confounders. Job histories were evaluated by expert chemists and hygienists

and translated into a history of occupational exposures. On the basis of results of preliminary analyses and literature review, we selected 16 occupations and industries and 32 substances for in-depth multivariate analysis using the pooled group of cancer and population controls. We found elevated risks for excavators and pavers, forestry workers, electric and electronic workers, motor transport workers, and food industry employees. The substances that were most plausibly associated with gastric cancer were: crystalline silica, leaded gasoline, grain dust, lead dust, zinc dust, hydraulic fluids, and glycol ethers. The paucity of data documenting the association between most of these occupational circumstances and gastric cancer precludes drawing firm conclusions.

## 5. A case-cohort study of diet and risk of benign proliferative epithelial disorders of the breast (Canada)

*Thomas E Rohan, Meera Jain, Anthony B Miller*
***Cancer Causes Control*** *1998;9(1):19–27*

A case-cohort analysis of the association between diet and risk of benign proliferative epithelial disorders (BPED) of the breast was undertaken within a cohort of 56,537 women who were enrolled in the Canadian National Breast Screening Study (NBSS) and who completed a self-administered dietary questionnaire. (The NBSS is a randomized controlled trial of screening for breast cancer in women aged 40 to 59 years.) BPED are thought to have premalignant potential. Specific hypotheses were that risk of BPED would increase with increasing energy-adjusted fat intake and decrease with increasing energy-adjusted vitamin A and fiber intake. Additionally, we explored the association between calcium intake and risk of BPED. During the active follow-up phase of the NBSS, 657 women in the dietary cohort were diagnosed with biopsy-confirmed incident BPED. For comparative purposes, a subcohort consisting of a random sample of 5,581 women was selected from the full dietary cohort. After exclusions for various reasons, the analyses were based on 545 cases and 4,921 non-cases. Overall, the results were almost uniformly null, and provided little support for the study hypotheses. Rate ratios (95 percent confidence intervals [CI] for the highest cf the lowest quintile levels for total fat, retinol, β-carotene, fiber, and calcium were 0.88 (CI =0.65–1.20), 0.97 (CI = 0.71–1.31), 0.94 (CI = 0.70–1.27), 1.11 (CI = 0.82–1.50), and 0.81 (CI = 0.60–1.07), respectively. There were too few cases of atypical BPED for meaningful analysis, but results for those whose BPED showed no atypia were similar to the overall results. Further analyses conducted separately in the screened and control arms of the NBSS also failed to provide strong support for dietary associations, as did those conducted separately for screen-detected and interval-detected BPED.

## 6. Firearm-related deaths in the United States and 35 other high- and upper-middle-income countries

*EG Krug, KE Powell, LL Dahlberg*
***Int J Epidemiol*** *1998;27(2):214–21*

*Background:* The Forty-Ninth World Health Assembly recently declared violence a worldwide public health problem. Improved understanding of cross-national differences is useful for identifying risk factors and may facilitate prevention efforts. Few cross national studies, however, have explored firearm-related deaths. We compared the incidence of firearm-related deaths among 36 countries.

*Methods:* Health officials in high-income (HI) and upper-middle-income countries (UMI) with populations greater than one million were asked to provide data using ICD-9 codes on firearm-related homicides, suicides, unintentional deaths and deaths of undetermined intent, as well as homicides and suicides for all methods combined. Thirty-six (78%) of the 46 countries provided complete data. We compared age-adjusted rates per 100 000 for each country and pooled rates by income group and geographical location

*Results:* During the one-year study period, 88 649 firearm deaths were reported. Overall firearm mortality rates are five to six times higher in HI and UMI countries in the Americas (12.72) than in Europe (2.17) or Oceania (2.57) and 95 times higher than in Asia (0.13). The rate of firearm deaths in the United States (14.24 per 100 000) exceeds that of its economic counterparts (1.76) eightfold and that of UMI countries (9.69) by a factor of 1.5. Suicide and homicide contribute equally to total firearm deaths in the US, but most firearm deaths are suicides (71%) in HI countries and homicides (72%) in UMI countries.

*Conclusions:* Firearm death rates vary markedly throughout the industrialized world. Further research to identify risk factors associated with these variations may help improve prevention efforts.

## 7. Controlling confounding when studying large pharmacoepidemiologic databases: a case study of the two-stage sampling design

*Jean-Paul Collet, Douglas Schaubel, James Hanley, Colin Sharpe, Jean-François Boivin*
***Epidemiology*** *1998;9(3):309–15*

Large drug databases have been the source of interesting developments for pharmacoepidemiologic research, because they provide relatively accurate drug exposure histories. An important limitation of these databases is the lack of information on potential confounders. One solution, developed more than a decade ago but not widely used, is "two-stage sampling," in which stage 1 is the collection of information on drug exposure and outcomes, and stage 2 is the collection of confounder data on a subset of the stage 1 sample. The balanced design, wherein an equal number of individuals is selected from each drug exposure/disease category, is usually the most efficient strategy by which to select the stage 2 sample. We illustrate the efficiency of the balanced design in two-stage sampling using data from a provincial health organization and a simulation. We also evaluate the relative importance of factors affecting the precision of the effect estimate of the exposure of interest.

## 8. Benzodiazepine use and motor vehicle accidents

*Systematic review of reported association*

*Roger E Thomas*
***Can Fam Physician*** *1998;44:799–808*

OBJECTIVE: To examine the relationship between benzodiazepine (BZD) use and motor vehicle accidents (MVAs).

DATA SOURCES: MEDLINE was searched from 1980 to 1997 using the key words traffic accidents or motor vehicle accidents and benzodiazepines (and alternative terms and outcomes) in English, German, French, or Italian.

STUDY SELECTION: Case-control studies of BZDs and MVAs; police or emergency studies of BZD use among travelers; driving tests with subjects taking BZDs. Outcomes were impaired driving, accidents; mortality; postaccident medical attention, emergency ward care, or hospitalization. Quality criteria were whether all driving BZD users and non-users had an equal chance of entering the study; whether medication dosage and timing were ascertained; whether all kilometres driven by BZD users and non-users were studied; whether all types of accidents were ascertained; and whether medical conditions were controlled for.

SYNTHESIS: In case-control studies, the odds ratios for mortality and emergency medical treatment ranged from 1.45 to 2.4 in relation to time of use and quantity of drug taken. In police and emergency ward studies, BZD use was a factor in 1% to 65% of accidents (usually 5% to 10%). In two studies where subjects had blood alcohol concentrations less than the legal limit, BZDs were found in 43% and 65% of subjects. In one study with controls, 5% of drivers and 2% of controls in accidents had used BZDs.

CONCLUSIONS: Case-control studies suggest using BZDs approximately doubles the risk of motor vehicle accidents. The risk for drivers older than 65 of being involved in reported motor vehicle collisions is higher when they take longer-acting and larger quantities of BZDs.

## 9. Playing-related musculoskeletal disorders in musicians: a systematic review of incidence and prevalence

*Christine Zaza*
***Can Med Assoc J** 1998;158(8):1019–25*

*Background:* Work-related musculoskeletal disorders cause pain, disability and loss of employment for many workers, including musicians. Although performing arts medicine is a growing field, the health problems of musicians remain under-recognized and under-researched. Therefore, the author undertook a systematic review of published information on the incidence and prevalence of playing-related musculoskeletal disorders (PRMDs) in classical musicians.

*Methods:* Seven databases were searched for the period 1980 to 1996. The main textbook and performing arts medicine journals were searched manually, as were reference lists of all relevant papers. The author also contacted individuals familiar with the literature of performing arts medicine. Studies were included for review if they reported PRMD incidence or prevalence in classical musicians. Of the 24 studies identified, 18 cross-sectional surveys and cohort studies were reviewed. The author subjectively assessed the studies using criteria modified from an existing evaluation scale and used 4 criteria for data combination. On the basis of prevalence values from the eligible studies, $\chi^2$ tests for heterogeneity were performed.

*Results:* Only one study estimated PRMD incidence. Ten of the 17 prevalence studies were ineligible for data combination, because of low response rates and other methodological problems. In the 7 eligible studies, PRMD point prevalence ranged from 39% to 87% in adult musicians and from 34% to 62% in secondary school music students. The best estimates of PRMD prevalence were derived from the 3 studies that excluded mild complaints; these studies indicated that PRMD prevalence was 39% and 47% in adults and 17% in secondary school music students respectively. Statistical combination of data across studies within each demographic category was not possible.

*Interpretation:* Available data indicate that the prevalence of PRMD in adult classical musicians is comparable to the prevalence of work-related musculoskeletal disorders reported for other occupational groups. Several recommendations for future research are outlined.

## 10. Socioeconomic differences in the use of physician services in Nova Scotia

*George Kephart, Vince Salazar Thomas, David R MacLean*
***Am J Public Health** 1998;88(5):800–3*

*Objectives.* Socioeconomic differences in the use of physician services in Nova Scotia, Canada were examined.

*Methods.* The study was based on survey data, containing information on socioeconomic status, linked to physician claims data. Socioeconomic differences in use of physician services were estimated, adjusted for age, sex, and region of residence.

*Results.* Large socioeconomic differences were observed in the use of physician services, with use inversely related to both household income and education. These differences remained after adjustment for age, sex, and region.

*Conclusions*. Use of physician services is inversely associated with socioeconomic status.

## 11. Are drivers with CVD more at risk for motor vehicle crashes?
### *Study of men aged 45 to 70*

*Rémi Guibert, Louise Potvin, Antonio Ciampi, Jacinthe Loiselle, Lise Philibert, Eliane D Franco*
***Can Fam Physician** 1998;44:770–6*

OBJECTIVE: To examine whether male drivers aged 45 to 70 years suffering from cardiovascular disease (CVD) are more likely to be involved in motor vehicle crashes (MVC) that are reported to the police.

DESIGN: Population-based case-control study.

SETTING: Data on drivers' ages and medical conditions were compiled from the Société de l'assurance automobile du Québec's (SAAQ) computerized files. A questionnaire was mailed to all subjects to collect additional information on annual distances driven and various driving behaviours.

PARTICIPANTS: Age-stratified population-based random sample. Subjects were 2504 drivers involved in MVCs during a 6-month period; controls were 2520 drivers not involved in crashes.

MAIN OUTCOME MEASURES: Proportion of drivers with CVD involved in MVCs.

RESULTS: Response rate to the questionnaire was 35.5%. Analysis of the SAAQ files' entire sample of 5024 drivers showed that drivers suffering from CVD were less likely to be involved in MVCs (odds ratio [OR] 0.82, 95% confidence interval [CI] 0.67 to 0.99) than drivers without CVD. Although the estimate of risk remains unchanged when adjusted for age, it becomes statistically insignificant. It also remains unchanged and statistically insignificant when adjusted for yearly distance driven and driver behaviour, as shown by responses to the questionnaire. Drivers suffering from CVD drove significantly less each year (8900 km) than drivers without medical conditions (13 000 km).

*CONCLUSION:* This study shows no increased risk of motor vehicle crashes for drivers suffering from CVD.

## 12. An ecologic analysis of psychosocial stress and heart disease in British Columbia

*Susan J Elliott, Amy Dean*
***Can J Public Health** 1998;89(2):137–40*

Cardiovascular disease is the leading cause of death in Canada. However, much heart disease incidence cannot be explained by known risk factors, and evidence points to the potential role played by the psychosocial environment. This study involves an ecologic analysis exploring the relationships between psychosocial stress and ischaemic heart disease (IHD) in British Columbia. First, data from the Canada Health Promotion Survey correlated stress indicators (i.e, education, marital status) with self-reported stress levels. Results showed gender differences in stress. Stage II consisted of a multivariate analysis of ischaemic heart disease mortality in B.C. Results indicate a strong association between heart disease outcomes and educational background for both males and females. Findings of this study support a link between IHD and psychosocial factors. The results of the multiple regression must be interpreted with caution, given the use of an ecologic analysis. Additional research at the individual level is needed to fully understand these relationships.

## 13. Adverse reproductive outcomes among women exposed to low levels of ionizing radiation from diagnostic radiography for adolescent idiopathic scoliosis

*Mark S Goldberg, Nancy E Mayo, Adrian R Levy, Susan C Scott, Benoit Poîtras*
***Epidemiology** 1998;9(3):271–8*

In a cohort of women followed up for adolescent idiopathic scoliosis, we assessed the association between exposure to ionizing radiation from diagnostic radiography received in adolescence and subsequent adverse reproductive outcomes in adulthood. We estimated risk for unsuccessful attempts at pregnancy, spontaneous abortions, low birthweight (<2,500 gm), congenital malformations, and stillbirths according to dose to the ovaries. We used regression models for binary and continuous outcomes, accounting for key covariates and for clustering in the data that arose from women having multiple pregnancies. Risks in the adolescent idiopathic scoliosis cohort were higher than in the reference group for unsuccessful attempts at pregnancy [adjusted odds ratio (OR) = 1.33; 95% confidence interval (CI) = 0.84–2.13], spontaneous abortions (OR = 1.35; 95% CI = 1.06–1.73), and congenital malformations (OR = 1.20; 95% CI = 0.78–1.84), but the odds ratios did not increase monotonically by dose to the ovaries. There were fewer stillbirths (OR = 0.38; 95% CI = 0.15–0.97) and low-birthweight infants in the adolescent idiopathic scoliosis cohort (OR = 0.84; 95% CI = 0.59–1.21). Nevertheless, when the analysis of low birthweight was restricted to the adolescent idiopathic scoliosis cohort, the adjusted odds ratios were found to increase by quartiles of dose (median dose of 0.69 cGy): 1; 1.43 (95% CI = 0.54–3.90); 2.24 (95% CI = 0.89–5.94); and 2.34 (95% CI = 1.02–5.62). We also found that the adjusted mean birthweight decreased with increasing dose by 37.6 gm per cGy (standard error = 23.5 gm per cGy). Associations between adverse reproductive outcomes and radiotherapy have been observed previously, but this is the first study in which an association with birthweight has been found with diagnostic radiography.

## 14. Fertility among a cohort of male sawmill workers exposed to chlorophenate fungicides

*Helen Heacock, Robert Hogg, Stephen A Marion, Ruth Hershler, Kay Teschke, Helen Dimich-Ward, Paul Demers, Shona Kelly, Aleck Ostry, Clyde Hertzman*
***Epidemiology** 1998;9(1):56–60*

The purpose of this study was to determine whether exposure to chlorophenate fungicides and their dioxin contaminants is associated with male infertility among sawmill workers. The study was conducted using fertility data compiled from 26,487 sawmill workers in 14 British Columbian sawmills. Our analysis was restricted to workers who had been employed for at least 1 continuous year between 1950 and 1985 and to live-births born at least 1 year after the initiation of employment in the period 1955–1988. We assessed fertility trends by internal comparison using Mantel-Haenszel rate ratios and by calculating standardized fertility ratios using an external and an internal reference population. We identified 19,684 births in the study period. Initially, both external and internal analyses showed that sawmill workers from mills using chlorophenates had lower fertility than workers employed in mills not using chlorophenates. After controlling for time since first hire, however, we found no inverse relation between cumulative exposure to chlorophenate fungicides and fertility. Based on the results of our study, there is little evidence for a reduction in fertility among chlorophenate-exposed sawmill workers in British Columbia. The analyses indicate the importance of time since hire as a potentially strong confounder in this type of investigation.

## 15. The decline in Rh hemolytic disease: should Rh prophylaxis get all the credit?

*KS Joseph, Michael S Kramer*
***Am J Public Health** 1998;88(2):209–15*

*Objectives.* This study sought to quantify the magnitude of Rh disease reduction occurring secondary to Rh prophylaxis and other determinants.

*Methods.* Outcomes considered included maternal Rh sensitization, neonatal Rh disease, and perinatal deaths from Rh disease. Analysis was based on Poisson regression modeling of ecological data from Manitoba, Canada and conditional probability modeling.

*Results.* The ecological analysis showed that changes in birth order and Rh prophylaxis resulted in 24% (95% confidence interval [CI] = 1%, 42%) and 69% (95% CI = 61%, 76%) decreases, respectively, in Rh sensitizations (D and non-D) in Manitoba between 1963 and 1988. Rh prophylaxis and nonprogram factors were responsible for 83% (95% CI = 44%, 95%), and 78% (95% CI = 42%, 91%), respectively, of the reduction in perinatal deaths from Rh disease. Similar results were obtained with conditional probability modeling, which also provided estimates for the effects of changes in abortion rates and racial composition.

*Conclusions.* In addition to Rh prophylaxis, changes in other determinants were responsible for an important fraction of the decline in Rh disease. These results provide a historical perspective on the conquest of Rh disease and also have important implications for public health policy, particularly in developing countries.

## 16. External causes of death among persons with developmental disability: the effect of residential placement

*David Strauss, Robert Shavelle, Terence W Anderson, Alfred Baumeister*
***Am J Epidemiol** 1998;147(9):855–62*

The authors analyzed death rates from external causes (accidents, injuries, homicides, etc.) for persons with developmental disability in California. There were 520 such deaths during the 1981–1995 study period, based on 733,705 person-years of exposure; this represents all persons who received any services from the state. Compared with the general California population, persons with developmental disability were at lower risk of homicide, suicide, and poisonings (standardized mortality ratios, 0.31–0.68), but higher risk of pedestrian accidents, falls, fires, and, especially, drowning (standardized mortality ratio = 6.22). A major focus of the study was comparisons between different residential settings. Persons in semi-independent living had significantly higher risk than did those in their family home or group homes, with homicide rates being three times higher and pedestrian accident rates being doubled, while persons in institutions had much lower risks with respect to most causes. Of the 28 deaths due to drug and medication overdoses, 79 percent occurred in supported living or small-group homes. Avoidable deaths could be reduced by making direct care staff more aware of the risks and better trained in acute care, along with improved monitoring of special incidents.

## 17. Trends and variations in neonatal length of in-hospital stay in Canada

*Shi Wu Wen, Shiliang Liu, Dawn Fowler*
***Can J Public Health** 1998;89(2):115–9*

*Purpose:* To analyze spatio-temporal variations of neonatal length of in-hospital stay in Canada.

*Method:* The length of in-hospital stay of 1,469,761 newborns in Canadian hospitals from April l, 1984 to March 31, 1995 recorded by the Canadian Institute for Health Information was analyzed.

*Results:* Neonatal length of in-hospital stay decreased from an average of 5.0 days in 1984 to 2.9 days in 1994. In 1994, the average neonatal length of in-hospital stay in Alberta was 2.5 days, which was 0.2 to 1.5 days shorter than other provinces. The spatio-temporal variations in neonatal length of in-hospital stay could not be explained by corresponding variations in birthweight and other neonatal disorders.

*Conclusions:* Neonatal length of in-hospital stay has been substantially reduced in Canada in recent years but there remain important interprovincial variations. These variations are unlikely to be the results of changes or differences in patient-specific factors; policy played an important role.

## 18. Inclement weather and the risk of hip fracture

*Adrian R Levy, Dov R Bensimon, Nancy E Mayo, Henry G Leighton*
***Epidemiology** 1998;9(2):172–7*

An association between inclement weather and hip fractures has been documented, but specific subgroups of the population at particular risk have not been identified. We obtained information that included hospitalization data on all hip fractures in Montreal from 1982 to 1992, and meteorologic data on the amount of snow, rain, and freezing rain and the temperature on each day of study. We used a cross-level design to examine the association between the rate of hip fractures and the meteorologic conditions on the day of the accident in both sexes and five age strata. There were a total of 18,455 hip fractures over the 4,018-day study period. We found a cyclical pattern in occurrence of hip fractures, with the peak occurring in mid-December among women and the first week of January among men. The pattern was less pronounced among women than men, with peak-to-trough ratios of 1.2 and 1.4, respectively. Days with lower temperatures, snow, and freezing rain were associated with increased rates of hip fracture. The meteorologic condition carrying the greatest risk was freezing rain. The association between inclement weather and hip fractures was stronger among younger persons, both women and men. After adjusting for meteorologic variables, there remained increases in winter of 5% among women and 12% among men. The residual effect of winter may be related to cold temperatures or due to an accumulation of ice and snow even on fine days. Other possible mechanisms to explain the residual effect of winter include slower reaction times and winter bone loss, both of which could affect indoor as well as outdoor falls.

## 19. Participatory research with Native community of Kahnawake creates innovative Code of Research Ethics

*Ann C Macaulay, Treena Delormier, Alex M McComber, Edward J Cross, Louise P Potvin, Gilles Paradis, et al.*
***Can J Public Health** 1998;89(2):105–8*

Participatory research requires ethical guidelines to incorporate the needs of the partners i.e., the researchers and the community. This paper describes the background, development and implementation of an innovative Code of Research Ethics developed for a participatory research project with a Native community in Canada. The document ensures that responsibility and control will be shared by both researchers and community throughout the project including joint publication of the results. It defines community control of data, means of resolving dissension at time of publication, incorporation of new researchers and the differences between community-based and academic researchers.

## 20. End-stage renal disease projections for Canada to 2005 using Poisson and Markov models

*Douglas E Schaubel, Howard I Morrison, Marie Desmeules, Daria Parsons, Stanley SA Fenton*
***Int J Epidemiol** 1998;27(2):274–81*

*Background:* End-stage renal disease (ESRD) incidence and prevalence are increasing in many countries worldwide. Due to the high cost of therapy, predicting future numbers of patients requiring dialysis and transplantation is necessary for health care planners. Projecting therapy-specific chronic disease prevalence is inherently problematic, and examples of suitable models and their application are sparse. When applied, rarely was the adequacy of such models evaluated.

*Methods:* We describe and illustrate a method for projecting therapy-specific ESRD prevalence in Canada for 1995–2005 using data obtained from the Canadian Organ Replacement Register. The projections combine the Poisson model for incidence rates and a Markov model for patient follow-up. Model adequacy is empirically validated by data-splitting.

*Results:* Large increases in ESRD prevalence are expected in Canada, with an average annual increase of 6.9% projected for 1995–2005. Upon validation, the projection model based on 1981–1987 data was able to predict 1994 prevalence within 1%, while projected therapy-specific prevalences closely approximated those observed.

*Conclusions:* Therapy-specific ESRD prevalence was successfully projected using Poisson and Markov models. Where multistate prevalence forecasts are required, the method could be augmented for application to various other chronic diseases.

# *Calendar of Events*

| | | |
|---|---|---|
| **August 15–19, 1998**<br>**Boston, Massachusetts**<br>**USA** | 10th Conference of the International Society for Environmental Epidemiology and<br>8th Conference of the International Society of Exposure Analysis<br><br>Web sites:<br>http://www.med.ualberta.ca/PHS/ISEE<br>http://www.iit.edu/~butler/isea | *Information*<br>Carol Rougvie, Conference Secretariat<br>JSI Research and Training Institute<br>44 Farnsworth Street<br>Boston, Massachusetts<br>USA 02210-1211<br>Tel: (617) 482-9485<br>Fax: (617) 482-0617<br>E-mail: isee&isea98@jsi.com |
| **August 23–28, 1998**<br>**Rio de Janeiro, Brazil** | 17th International UICC Cancer Congress | *Information*<br>Congrex do Brasil Ltda.<br>Av. Presidente Wilson 164/9 andar<br>RJ 20030-020 Rio de Janeiro, Brasil<br>Tel: +55 21 - 509 40 80<br>Fax: +55 21 - 509 14 92<br>E-mail: congress@uicc.org |
| **August 29–Sept 2, 1998**<br>**Singapore** | 3rd International Heart Health Conference<br>Organized by the Singapore National Heart Association<br>Sponsored by the Minister of Health Singapore, the Singapore Cardiac Society, and the International Society and Federation of Cardiology | *Information*<br>3rd International Heart Health Conference<br>c/o World Express Pte Ltd<br>114 Middle Road #05-01<br>Lee Kai House<br>Singapore 188971<br>Tel: (65) 336-3875 / (65) 336-3877<br>Fax: (65) 339 7843 / (65) 339 8625<br>E-mail: wxpsin@singnet.com.sg |
| **September 9–12, 1998**<br>**Lethbridge, Alberta** | "Health in Rural Settings: From the Ground Up"<br>International Multi-disciplinary Conference on Rural Health | *Information*<br>Health in Rural Settings Conference<br>c/o The University of Lethbridge<br>Box #7, 4401 University Drive<br>Lethbridge, Alberta T1K 3M4<br>Tel: (403) 382-7152<br>Fax: (403) 329-2668<br>E-mail: rhc@uleth.ca<br>Web site: http://home.uleth.ca/rhc |
| **September 24–27, 1998**<br>**Toronto, Ontario** | Royal College of Physicians and Surgeons of Canada 67th Annual Meeting<br>In collaboration with The Canadian Society for Clinical Investigation and participating societies | *Information*<br>774 Echo Drive<br>Ottawa, Ontario K1S 5N8<br>Tel: (613) 730-8177 *or* 1-800-668-3740<br>Fax: (613) 730-8252<br>Web site: http://rcpsc.medical.org |
| **October 15–18, 1998**<br>**Halifax, Nova Scotia** | "Aging: Benefits and Burdens — Crosswinds of Change"<br>27th Annual Scientific and Educational Meeting of the Canadian Association on Gerontology | *Information*<br>CAG '98 Conference Secretariat<br>500 – 1306 Wellington Street<br>Ottawa, Ontario K1Y 3B2<br>Tel: (613) 728-9347<br>Fax (613) 728-8913<br>E-mail: cagacg@magi.com |

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| **October 18–20, 1998**<br>**Saskatoon, Saskatchewan** | "The Bridge to Farm Safety and Health"<br>4th Annual Canadian Farm Safety and Health Conference<br>Organized by the Canadian Coalition for Agricultural Safety and Rural Health | *Information*<br>Canadian Coalition for Agricultural Safety and Rural Health<br>103 Hospital Drive, PO Box 76<br>Saskatoon, Saskatchewan S7N 0W8<br>Tel: (306) 966-8499<br>Fax: (306) 966-8891<br>E-mail: IMCEAMS-SCHPO_MASTER_CCASRH@sdh.sk.ca |
| **October 20–24, 1998**<br>**Ottawa, Ontario** | Canadian Cardiovascular Society Annual Meeting | *Information*<br>Charles Shields, Executive Director<br>Canadian Cardiovascular Society<br>222 Queen Street, Suite 1403<br>Ottawa, Ontario K1P 5V9<br>Tel: (613) 569-3407<br>Fax: (613) 569-6574<br>E-mail: http://www.ccs.ca |
| **November 1–4, 1998**<br>**Victoria, BC** | "Itch '98: New Partnerships — Better Care"<br>International Conference on Information Technology Issues in Community Health<br><br>Web site:<br>http://www.hsd.uvic.ca/HIS/ITCH/ITCH.htm | *Information*<br>ITCH '98 c/o Dr Paul Fisher<br>School of Health Information Science<br>PO Box 3050<br>University of Victoria<br>Victoria, BC V8W 3P5<br>Tel: (250) 721-8576<br>Fax: (250) 721-1457<br>E-mail: his@hsd.uvic.ca |
| **November 2–4, 1998**<br>**Barrie, Ontario** | "Valuing the Public's Health ... It's Everybody's Business"<br>49th Annual Ontario Public Health Association Conference<br>Hosted by Simcoe County District Health Unit | *Information*<br>Heather Edgar<br>Simcoe County District Health Unit<br>Tel: (705) 721-7330<br>Fax: (705) 721-1495 *or*<br>Tel: (416) 367-3313 (OPHA) |
| **November 15–18, 1998**<br>**Ottawa/Hull, Canada** | "Partnerships for Health: A Work in Progress"<br>5th Canadian Conference on International Health<br><br>Web site: http://www.csih.org/ccih/ccih.html | *Information*<br>Conference Co-ordinator<br>Canadian Society for International Health<br>One Nicholas Street, Suite 1105<br>Ottawa, Ontario K1N 7B7<br>Tel: (613) 241-5785, ext 306<br>Fax: (613) 241-3845<br>E-mail: ccih@csih.org |
| **November 15–18, 1998**<br>**Halifax, Nova Scotia** | Canadian Heart Health Network Meeting<br>Organized by Heart Health Nova Scotia, Heart and Stroke Foundation of Canada, Heart and Stroke Foundation of Nova Scotia and Health Canada | *Information*<br>Conference Secretariat Agenda Management Inc.<br>Tel: (902) 422-1886<br>Fax: (902) 422-2535<br>E-mail: agenda@ns.sympatico.ca |
| **December 8–10, 1998**<br>**Atlanta, Georgia**<br>**USA** | "Prevention: Translating Research into Public Health Practice"<br>13th National Conference on Chronic Disease Prevention and Control<br>Sponsored by the CDC and ASTCDPD | *Information*<br>Tel: (303) 280-1112<br>Web site: http://www.cdc.gov/nccdphp |

# CDIC: Information for Authors

*Chronic Diseases in Canada* (CDIC) is a peer-reviewed scientific journal published four times a year. Contributions are welcomed from outside of Health Canada as well as from within this federal department. The journal's focus is the prevention and control of non-communicable diseases and injuries in Canada. This may include research from such fields as epidemiology, public/community health, biostatistics, behavioural sciences and health services. Submissions are selected based on scientific quality, public health relevance, clarity, conciseness and technical accuracy. Although CDIC is a Health Canada publication, authors retain responsibility for the contents of their papers, and opinions expressed are not necessarily those of the CDIC Editorial Committee or of Health Canada.

## Feature Articles

Most feature articles should be limited to 3500 words of text (with an unstructured abstract of less than 150 words) in the form of original research, surveillance reports, meta-analyses, methodological papers or literature reviews. Short Reports are limited to 1500 words, with an unstructured abstract of less than 100 words. Position Papers should not exceed 3000 words in length.

Under normal circumstances, the following other types of feature articles will be considered as submissions only from authors within Health Canada: Status Reports describing ongoing national programs, studies or information systems of interest to chronic disease researchers and public health practitioners (3000 words maximum); and Workshop/Conference Reports of relevant workshops, etc. organized or sponsored by Health Canada (3000 words maximum).

Authors outside of Health Canada may submit reports for our Cross-country Forum (3000 words maximum) to exchange information and insights about the prevention and control of chronic diseases and injuries from research or surveillance findings, programs under development, program evaluations or position papers.

## Additional Article Types

Letters to the Editor are welcomed for consideration, limited to 500 words of text. Book/Software Reviews should not exceed 1300 words and should include publication and ordering information.

Guest Editorials are usually solicited by the editors for particular theme issues. Fact Sheets on particular chronic diseases are considered for publication only from within the Laboratory Centre for Disease Control.

## Submitting Manuscripts

Manuscripts should be submitted to the Editor-in-Chief, *Chronic Diseases in Canada*, Laboratory Centre for Disease Control, Health Canada, Tunney's Pasture, CDIC Address Locator: 0602C3, Ottawa, Ontario K1A 0L2.

Since *Chronic Diseases in Canada* adheres in general to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" as approved by the International Committee of Medical Journal Editors, authors should refer to the *Canadian Medical Association Journal* 1997 Jan 15; 156(2): 270–7 for complete details.

Each submission should have a covering letter signed by all authors that identifies the corresponding author (including address, telephone number and fax number) and states that all authors have seen and approved the final manuscript and have met the authorship criteria of the Uniform Requirements. The covering letter should also include a full statement regarding any prior or duplicate publication or submission for publication. Written permission from anyone mentioned by name in the acknowledgements should appear at this time. Suggestions for appropriate peer reviewers would be appreciated as well.

Manuscripts may be submitted in either English or French and will be published in both languages, if accepted. Submit three complete printed copies of a manuscript, double-spaced on one side of standard-sized paper with one-inch margins. Each section (i.e. title page, abstract and key words, text, acknowledgements, references, tables and figures) should begin on a separate, numbered page.

If a manuscript is accepted for publication, send the final hardcopy version with the accompanying text file in WordPerfect 5.1/5.2 or 6.0/6.1 (or converted to ASCII) on an IBM-compatible disk formatted for MS-DOS. Label the disk with the first author's name and specify the software used.

## Abstract and Key Words

An unstructured abstract not exceeding 150 words (limit of 100 words only for Short Reports) must accompany each manuscript with three to eight key words noted below, preferably from the Medical Subject Headings (MeSH) of *Index Medicus*.

## Tables and Figures

Tables and figures should be as self-explanatory and succinct as possible. They should not simply duplicate the text, but should illuminate and supplement it, and they should not be too numerous. Place them on separate pages after the references, numbered in the order that they are mentioned in the text.

Provide explanatory material for tables in footnotes, identifying the table footnotes by lower-case superscript letters in alphabetical order.

Figures should be limited to graphs or flow charts/templates; we are unable to publish photographic illustrations at this time. Specify the software used (preferably Harvard Graphics) and supply raw data (in hardcopy form) for all graphs. *Do not import figures into the text of a WordPerfect document.*

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# *Chronic Diseases in Canada*

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