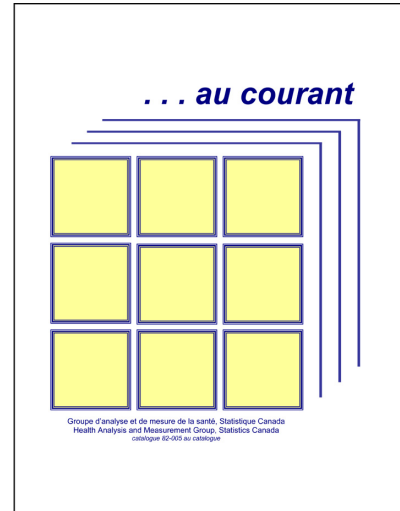




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October 2002

Catalogue no. 82-005-XIE

Frequency: Irregular

ISSN: 1703-2180

Ottawa

La version française de cette publication est disponible sur demande (n° 82-005-XIF au catalogue).

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.



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UP FRONT...

Here we grow again!

Many of you know the Health Analysis and Measurement Group (HAMG) as the POHEM (Population Health Model) people. We hope this issue of ...*au courant* will demonstrate the relevance of our simulation modeling related to health. More important, though, this work provides a point of departure for a broader and more comprehensive tool for integrating health information, the Canadian Burden of Disease, Injury, and Risk Factors. More about this later in future issues.

Our "in short" article below highlights another project that extends health information and analysis. The Health Services Access Survey responds to the need for information about patterns of use and barriers related to health care services across Canada.

I am happy to say that our group continues to expand, both in the scope of our work and in the strength of our analysis team. We have welcomed several new analysts over the past year, and continue to extend our collaboration with Health Canada and the research community.

Jean-Marie Berthelot, Manager

IN SHORT...

Health Services Access Survey: Identifying gaps in the health care needs of Canadians

At their September 2000 meeting, the First Ministers agreed that provincial and territorial governments would report to their constituents on key health indicator areas starting in September 2002. As of June 2001, data were not available for two of fourteen indicators: (a) waiting times for key diagnostic and treatment services and (b) access to "24-hour-a-day, 7-day-a-week (24/7)" first contact health services. Statistics Canada proposed the collection of these baseline data through a special household survey, the Health Services Access Survey, a supplement to the Canadian Community Health Survey 2000-01.

The Health Services Access Survey provides a first look at Canadians' experiences and perceptions regarding access to health services. It provides data on waiting times for specialist visits for a new illness or condition, non-emergency surgery, and selected diagnostic tests. It also provides information on access to health information and advice, routine care, and immediate care at various times of the day (i.e. regular office hours, evenings and weekends, middle of the night).

Survey respondents expressed keen interest in the subject, according to the interviewers, resulting in high participation rates. The final response rate was 81% of the 17,616 individuals selected in the initial sample. The survey content, while not expected to address perfectly the need for information on these two indicator areas, describes patterns of service utilization and difficulties experienced by respondents in accessing services during the past twelve months. Results were released July 15, 2002.

See our report: Sanmartin C, Houle C, Berthelot J-M, White K. *Access to Health Care Services in Canada, 2001*. Statistics Canada, Catalogue 82-575-XIE (available at www.statcan.ca, free publications)

Christian Houle

HAMG conducts policy-relevant research and quantitative analysis of health and social issues.



Modeling the burden of cancer in Canada

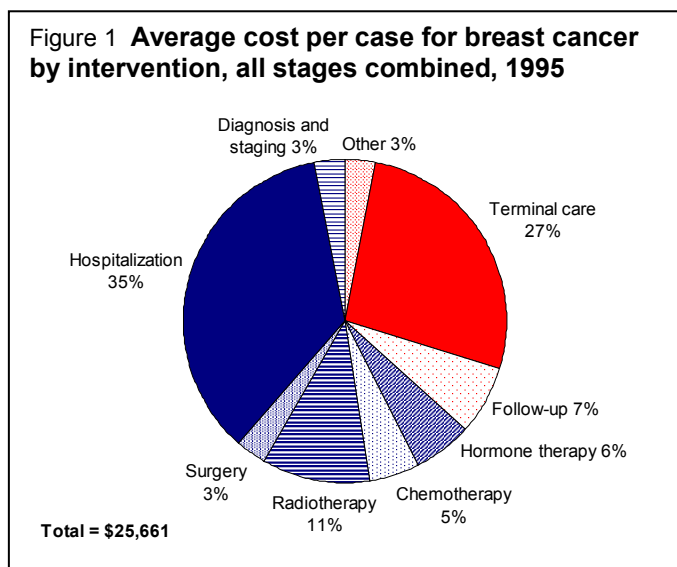
The Population Health Model (POHEM) is a policy analysis tool that helps answer “what-if” questions about the health and economic burden of specific diseases and the cost-effectiveness of administering new diagnostic and therapeutic interventions. This simulation model is particularly pertinent in an era of fiscal restraint, when new therapies are generally expensive and difficult policy decisions are being made. More important, it provides a base for a broader framework to inform policy decisions using comprehensive disease data and risk factors.

We acknowledge our valued collaborator, Dr. William K. Evans, medical oncologist and Executive Vice President of Cancer Care Ontario, who contributed untold hours to the development of the cancer models described below.

“Base case” models of cancer care

Our “base case” models were the first to comprehensively estimate the lifetime costs of treating breast, lung and colorectal cancer in Canada. This work depended on close collaboration with medical experts and access to many data sources for risk factors, disease incidence, stage at diagnosis, typical diagnostic and therapeutic approaches, disease progression, follow-up practice patterns, treatment at relapse and terminal care, and all associated costs.

All three cancer models highlighted that hospitalization for diagnostic work-up, initial surgery, palliation and terminal care was the main cost driver (see Figure 1). We have also modeled coronary heart disease, osteoporosis, arthritis and osteoporotic fractures.



Chemotherapy for advanced lung cancer

Best supportive care had generally been the standard therapy for advanced non-small cell lung cancer in Canada. As cancer management patterns changed over time, we modified our microsimulation models to evaluate the impact of new interventions.

Using a decision framework comparing current outpatient chemotherapy regimens by cost per life-year saved and by quality-adjusted life year gained, we found that the clinical standard of vinorelbine plus cisplatin was the most cost-effective of the new regimens. The Policy Advisory Committee of Cancer Care Ontario considered these results when deciding to fund vinorelbine and gemcitabine in Ontario.

Post-surgical breast cancer hospitalization

In 1995, the average length of hospital stay for women undergoing breast conserving surgery and mastectomy was about five and six days, respectively. We modeled the impact of outpatient breast conserving surgery and a two-day hospital stay for mastectomy and found that home care costs of \$453 per patient could potentially result in savings of about \$20 million for breast conserving surgery alone and \$13 million for mastectomy. (This assumed a 90% eligibility for home-based post-operative care and a 5% re-admission rate.) Reducing post-surgical breast cancer hospitalization and providing optimal home care support could produce major health care savings.

Administering tamoxifen to women at high risk of breast cancer

The Breast Cancer Prevention Trial (see Fisher, 1998) demonstrated that tamoxifen could reduce the risk of invasive breast cancer in high-risk women by 49%. With the cut-off used in this trial, a five-year risk of 1.66% or more for developing breast cancer, 23% of Canadian women in the year 2000 would be eligible for this intervention. From another perspective, the lifetime probability for a woman being eligible for tamoxifen was 85%.

Our simulation of this trial suggested that the detrimental effects of tamoxifen, which include endometrial cancer, coronary heart disease, stroke and deep vein thrombosis, likely outweigh the protective effect of tamoxifen on breast cancer for the majority of eligible women. Although it supported the use of tamoxifen for the 4% of Canadian women with a five-year predicted risk of 3.32% or more, our overall results raised questions about the use of tamoxifen for some otherwise healthy Canadian women.

Population-based colorectal cancer (CRC) screening in Canada

We also used our colorectal cancer simulation model to estimate the potential impact of population-based screening in Canada. Randomized controlled trials have shown the efficacy of screening for colorectal cancer using the faecal occult blood test with follow-up by colonoscopy.

Applied to a Canadian context, we found that biennial screening of 67% of individuals aged 50-74 in 2000 would result in an estimated 10-year CRC mortality reduction of 16.7%. The life expectancy of the cohort would increase by 15 days and the total demand for colonoscopy would increase by at least 15%. The estimated cost of screening would be \$112 million per year with a cost-effectiveness ratio of about \$12,000 per life-year gained (discounted at 5%).

This work helped the National Committee on CRC Screening to assess the potential impact and feasibility of population-based screening in Canada. Their report will be released soon.

Future directions: Canadian Burden of Disease, Injury and Risk Factors (CBD)

The microsimulation framework described above is a valuable tool to guide clinicians and health policy makers, integrating detailed documentation of current treatment modalities and costs of treatment for a specific disease. An expanded simulation framework will be developed to evaluate broader policies and programs for priority setting, allowing concurrent examination of a comprehensive set of diseases and the major risk factors associated with them.

In collaboration with Health Canada, the University of Manitoba, the University of Ottawa and the Montreal Centre Regional Health and Social Services Board, we are now developing such an expanded framework. This three-year project will estimate the Canadian burden of disease across disease groupings and risk factors. It will also provide a simulation infrastructure for evaluation of broad intervention strategies by policy analysts and projection of the future burden of disease and injury in Canada. This project has been peer-reviewed, and unanimously endorsed by members of the Advisory Committee on Population Health (ACPH) of the Conference of Deputy Ministers of Health.

In summary

An integrative microsimulation framework that can evaluate treatment modalities and overall costs of treating specific diseases such as lung or breast cancer is a valuable tool for clinicians and health policy makers. It answers “what-if” questions about the relative impact of alternative scenarios related to new therapies and intervention strategies.

Further work will broaden this approach to estimate the burden of disease, injury and risk factors in the Canada population, considering other health conditions that occur with or as a result of these diseases. The analytic results will help assess the impact of population health interventions within and across disease groupings and by risk factor. Answers to questions such as “What is the impact of hypertension or diabetes on cardiovascular diseases?” or “How is the burden of disease distributed by socio-economic status?” can inform program prioritization and resource allocation.

B. Phyllis Will, Kathy White, Jean-Marie Berthelot

Phyllis Will has recently retired after 21 years as a public servant, including 16 years at Statistics Canada. She continues to participate in HAMG activities (such as writing this article) through the Statistics Canada Alumni Program. Her career as research analyst focused mostly on social policy and health outcomes, and she was Chief of the Modeling Section of HAMG. For over a decade, Phyllis has collaborated with medical oncologists, cancer registry personnel, and other researchers to develop the models described here. She has presented these results around the world and has prepared many manuscripts for peer-reviewed journals.

Microsimulation Modeling

The POHEM microsimulation framework integrates diverse health data, analytical results and resource utilisation data for further analyses and decision making. The model generates a sample of synthetic individuals and ages them over time, based on data about risk factors, disease onset and progression, and consequent effects on health and functional status. The resulting longitudinal data set represents the full life cycle of a cohort of individuals born in the same year.

Using the Monte Carlo method, individuals are assigned demographic and labour force characteristics, health risk factors, and individual health histories typical of Canadians. Disease progression and case fatality are modeled allowing transition times in various health states such as stages of cancer progression. In these disease models, co-morbidities and competing risks from multiple disease processes are explicitly modeled.

See our articles

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Will BP, Nobrega KM, Berthelot J-M, Flanagan W, Wolfson MC, Logan DM, Evans WK. First do no harm: extending the debate on the provision of preventive tamoxifen. *Br J Cancer* 2001;85(9): 1280-8.

Related reading

Harvard School of Public Health on behalf of the World Health Organization and the World Bank. *The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020*. Murray CJL, Lopez AD, eds. Cambridge (MA): Harvard University Press, 1996. <http://www.hsph.harvard.edu/organizations/bdu/summary.html>

Mathers C, Vos T, Stevenson C. *The burden of disease and injury in Australia*. Cat. no. PHE 17. Canberra: Australian Institute of Health and Welfare, 1999. <http://www.aihw.gov.au/publications/health/bdia/#s02>

Victorian Burden of Disease Study: Mortality <http://hna.ffh.vic.gov.au/phd/9903009/>

Victorian Burden of Disease Study: Morbidity <http://www.dhs.vic.gov.au/phd/9909065/index.htm>

Recent publications

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Sanmartin C and Berthelot J-M. Regional differences in self-reported unmet health needs. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; S13 (in press).

Shields M and Tremblay S. The health of Canada's communities. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; S13.

Tremblay S, Ross N and Berthelot J-M. Ontario Grade 3 student achievement. *Canadian Social Trends*. (Statistics Canada Catalogue 11-008) Summer 2002, pp. 15-19.

Tremblay S, Ross N and Berthelot J-M. Regional socio-economic context and health. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; S13.

Wilkins R, Berthelot J-M, Ng E. Trends in mortality by neighbourhood income in urban Canada from 1971 to 1996. *Health Reports* (Statistics Canada, Catalogue 82-003) 2002; S13.

Yang H, Kramer MS, Platt R, Blondel B, Gréart G, Morin I, Wilkins R, Usher R. How does early ultrasound estimation of gestational age lead to higher rates of preterm birth? *American Journal of Obstetrics and Gynecology* 2002; 186(3): 433-7.

Announcements

Russell Wilkins has been appointed to the editorial board of the forthcoming WHO electronic journal *Mortality*, edited by Alan Lopez. He is also an editorial advisor to the new electronic *International Journal for Equity in Health*, published by the International Society for Equity in Health. Both journals are to be freely available on the internet through PubMed Central. Russell has been on the editorial board of *Les Cahiers Québécois de Démographie* (published by the Association de Démographes du Québec) since 1994. He was recently elected vice-president of the Canadian Population Society for 2002-2003; he will be responsible for organizing the Society's next annual meeting.

Seminars and workshops

HAMG seminar series: We are now preparing a fall schedule of seminars not to be missed! Anticipated topics are children's health and development and the Multinational Influenza Seasonal Mortality Study (MISMS).

Handling Missing Data: Karla Nobrega (with David Haziza of Household Survey Methods Division) recently presented this course at the Statistical Society of Canada 2002 Annual General Meeting. Slides are available upon request.

Multilevel modeling: Although fairly common in the field of education, multilevel modeling is still rare in health analyses. HAMG is organizing a workshop on multi-level modeling by Dr. Douglas Willms of the University of New Brunswick, September 30 to October 2, 2002.

**. . . au courant is published three times a year by the Health Analysis and Measurement Group, Statistics Canada.
Aussi disponible en français.**

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