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Performance of the Composite International Diagnostic Interview Short Form for Major Depression in Community and Clinical Samples

Scott B Patten

Abstract

The CIDI Short Form is a brief survey instrument designed to identify episodes of major depression. The instrument was developed for inclusion in the US National Health Interview Survey, but has also been used in the Canadian National Population Health Survey (NPHS). In this study, data deriving from use of the CIDI Short Form in the NPHS are compared to published data from the Mental Health Supplement of the Ontario Health Survey, which utilized a fully validated structured interview: the Composite International Diagnostic Interview (CIDI). In an additional analysis, the sensitivity and specificity of the Short Form were evaluated in relation to the full CIDI mood disorders section in a clinical sample of 122 psychiatric in-patients. Relative to published data from the Ontario Health Survey, application of the CIDI Short Form in the NPHS resulted in an overestimation of major depression prevalence by approximately 50%. In the clinical sample, the CIDI Short Form was highly sensitive (98.4%), but not highly specific (72.7%). Active medical conditions, substance use disorders and dysthymia were frequently observed among subjects with false positive CIDI Short Form ratings. The CIDI Short Form appears to overestimate the 12-month period prevalence of major depression when it is applied in community samples. Since the Short Form does not make exclusions for organically induced symptoms, it is probable that some subjects with depressive symptoms secondary to physical illnesses and/or drug exposures score above the instrument's threshold, perhaps leading to an elevation in period prevalence rates.

Key words: *Depressive disorder; diagnostic instruments; epidemiologic methods; major depression; prevalence*

Introduction

In the past 15–20 years, research in psychiatric epidemiology has shifted from an emphasis on psychiatric symptoms and general well-being to a focus on the distribution and determinants of mental disorders. This trend has been facilitated by the development of structured diagnostic interviews that can be conducted by lay interviewers. These instruments allow non-clinicians to collect data, greatly reducing data collection costs. Unfortunately, psychiatric structured diagnostic interviews tend to be lengthy, precluding their inclusion in large-scale surveys such as the US National Health Interview Survey and the Canadian National Population Health Survey (NPHS).

Kessler and Mroczek (Survey Research Center, University of Michigan, unpublished observations) have recently developed a brief questionnaire that is designed to predict the occurrence of major depression. The instrument contains a subset of questions from the Composite International Diagnostic Interview (CIDI), which is a validated structured diagnostic instrument.[1–3] Development of the short questionnaire began with exploratory regression analyses of CIDI survey data. This was followed by additional validation studies and modifications to

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question wording (Kessler and Mroczek, unpublished observations). The final result was an abbreviated instrument called the *CIDI Short Form for Major Depression.* This instrument can be administered, on average, in less than one minute.

In recent editions of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IIIR and DSM-IV), major depression is defined as a period of at least two weeks characterized by at least five severe and persistent depressive symptoms. The symptoms must not represent a normal reaction to the death of a loved one and should not be due to an identifiable organic factor such as a physical illness or drug exposure.[4,5] The questions contained in the CIDI Short Form inquire about the existence of individual depressive symptoms occurring during the same two-week period in the preceding 12 months. Therefore, inclusion of the CIDI Short Form in an epidemiologic survey leads to an estimate of the 12-month period prevalence of major depression in the population sampled.

In the NPHS, an algorithm proposed by Kessler and Mroczek (unpublished observations) was used to score the CIDI Short Form. According to these researchers' validation data, there is a 90% probability of major depression (in the preceding 12 months) in subjects reporting five or more depressive symptoms in response to the CIDI Short Form questions. Hence, a cut-point of five may be used to categorize respondents as having, or not having, major depression. This procedure was used by Beaudet in an analysis of the NPHS major depression data.[6]

Performance of the CIDI Short Form in the National Population Health Survey

The first objective of this study was to compare the 12-month period prevalence of major depression deriving from use of the CIDI Short Form in the NPHS to that of the Mental Health Supplement of the Ontario Health Survey. An estimate of the 12-month period prevalence of major depression using NPHS data has already been reported by Beaudet:[6] 5.6%. However, Beaudet's estimate applied to subjects aged 18 and over, whereas the Ontario survey reported data for subjects aged 15–64. Therefore, in order to facilitate this comparison, the 12-month period prevalence of major depression was recalculated from the NPHS data set for subjects aged 15–64.

In the NPHS, a complex multistage stratified sampling procedure was employed. In the NPHS public use microdata file,[7] this complex sampling was accounted for by the calculation of weights; hence, all estimates deriving from this data set are weighted estimates. In this study, confidence limits for these weighted estimates were calculated using approximate methods described in the NPHS microdata file documentation. The 12-month period prevalence of major depression among subjects aged 15–64 in the NPHS was 6.3%, with 95% confidence limits of 5.7% and 6.8%.

Offord et al. analyzed data from the Mental Health Supplement of the Ontario Health Survey.[8] This survey used a probability sample from the Ontario population aged 15–64. The full CIDI was administered to each subject, and a 4.1% 12-month period prevalence of major depression was reported (the standard error associated with this estimate was 0.4, leading to approximate 95% confidence limits [CL] of 3.3% and 4.9%, a confidence interval that does not overlap with that derived from the NPHS data).

One possible explanation for the difference between these two surveys is that the NPHS is based on a national sample, whereas the Ontario Health Survey was restricted to one Canadian province. However, when the NPHS data from the province of Ontario are considered alone, the 12-month period prevalence is similar to that of Canada as a whole: 6.5% (95% CL = 5.6%, 7.4%). A comparison of this prevalence with that reported by Offord et al.[8] amounts, essentially, to a comparison of the CIDI Short Form with the full CIDI in independent samples. In relative terms, the CIDI Short Form overestimated the 12-month period prevalence of major depression by approximately 50%.

A plausible explanation for the apparent overestimation of prevalence by the CIDI Short Form is a lack of specificity. False positive codings may occur for several reasons. First, depressive symptoms caused by excessive consumption of alcohol, ingestion of abused drugs, medication exposures or physical illnesses are not counted toward a diagnosis of major depression in the DSM-IIIR or the DSM-IV. Such organic exclusions are accounted for in the full CIDI, but not in the CIDI Short Form. Second, uncomplicated bereavement (normal grief) is not regarded as a mental disorder in the DSMs, even if severe and persistent depressive symptoms are present. Unlike the full CIDI, the CIDI Short Form incorporates no distinction between depressive disorders and bereavement.

It is conceivable, of course, that the Short Form may be somewhat insensitive because it contains fewer questions focusing on specific depressive symptoms than the full CIDI. For example, the CIDI contains several questions about different manifestations of sleep disturbance; these include questions about initial, middle and terminal insomnia and also hypersomnia. Any of these disturbances, if sufficiently severe and persistent, would fulfil a DSM diagnostic criterion for sleep disturbance that counts toward a diagnosis of major depression. The Short Form contains only a single question referring to initial insomnia. Since depression is sometimes characterized by middle or terminal insomnia, or by hypersomnia, the CIDI Short Form will sometimes miss important manifestations of sleep disturbance.

Since the Short Form appears to overestimate period prevalence, the false negative classifications (resulting from lack of sensitivity) are likely outweighed by false positive classifications (resulting from lack of specificity). This is not surprising for two reasons. First, since approximately 95% of the subjects in the sample do not have major depression, even small false positive misclassification rates will tend to increase the frequency observed. For example, in applying traditional models of misclassification bias[9]

under the assumption that the true prevalence is 4.1%, a 95% sensitivity (assuming perfect specificity) would bias the estimate downward to 3.9%, whereas a specificity of 95% (assuming perfect sensitivity) would bias the estimate upward by a much greater extent, to 8.9%.

The CIDI Short Form in a Clinical Sample

As outlined in the preceding section, a plausible factor influencing the performance of the CIDI Short Form in community samples may be a lack of specificity in subjects with depressive syndromes related to organic factors and bereavement. In order to evaluate this possibility, the mood disorders sections of the CIDI-Auto (an automated version of the full CIDI) and the CIDI Short Form were administered to a consenting series of 122 psychiatric in-patients.

The subjects were consenting participants in a hospital-based case-control study of risk factors for major depression being conducted at the Calgary General Hospital. There were 58 males and 64 females in the sample, ranging in age from 18 to 75 years with a median age of 33 years. The 62 subjects with CIDI-Auto diagnoses of major depression (296.2x — single episode, 296.3x — recurrent, 296.5x — bipolar disorder, depressed) in the preceding 12 months were compared to the remaining 60 subjects on the basis of their performance on the CIDI Short Form.

The Short Form was highly sensitive in this sample: 61 of 62 (98.4%) of the subjects with a full CIDI-confirmed major depressive episode scored five or more on the CIDI Short Form. This high degree of sensitivity of the instrument may reflect two aspects of the clinical sample: the severity of the disorders and their course in relation to the testing. Of the 62 cases where there was an episode of major depression in the preceding year, 52 (83.9%) of them were classified in the CIDI-Auto in the severe categories (296.23, 296.33 or 296.53). The single false negative subject on the CIDI Short Form, however, had a diagnosis of major depression, single episode, severe (296.23). Most of the disorders were active and had resulted in the current hospitalization; this may also have facilitated recall. In community samples, where disorders may have resolved months prior to evaluation, the Short Form may be less sensitive.

Of the 60 subjects without a major depressive episode in the previous year, 27 had bipolar disorders coded as manic, mixed or unspecified at the time of interview. Many of these subjects had scores of five or greater on the CIDI Short Form. However, these subjects could not be interpreted as false positives because the CIDI-Auto could not confirm that there had been no episode of major depression in the previous year (the interview codes their disorder and the nature of the most recent episode). Of the remaining 33 subjects, there were nine false positives, so that the false positive rate in this sample was 27.3% (specificity = 72.7%). Four of these nine subjects had one or more active medical conditions, three were diagnosed with substance-use disorders. These are both possible reasons for false positive codings, as described above. In addition, four of the subjects had dysthymia. Dysthymia is a chronic form of depressive disorder, typically characterized by fewer and less severe depressive symptoms than major depression. The distinction between these different categories of depressive disorder may require a more extensive evaluation of symptom frequency and severity than can be accomplished using the CIDI Short Form.

Summary

A comparison between the NPHS findings and those of the Ontario Health Survey suggests an overestimation of period prevalence by the CIDI Short Form. A tendency to overestimate prevalence may be expected since the Short Form's questions focus exclusively on depressive symptoms. The instrument does not exclude depressive symptoms that are related to physical illnesses or drug exposures, nor does it differentiate those circumstances where severe depressive symptoms are not pathological, such as bereavement. The frequency of active physical illnesses and substance use disorders in this study among false positive clinical subjects without major depression provides some confirmation of this theoretical possibility.

The brevity of the Short Form makes its inclusion in large-scale general population surveys feasible. Since large-scale national surveys such as the NPHS use probability sampling and incorporate numerous, diverse measures of health status determinants, the inclusion of the CIDI Short Form in the NPHS and other studies may offer opportunities for the advancement of mood disorders epidemiology.

However, data presented here indicate that the CIDI Short Form is vulnerable to errors in diagnostic classification. In analytical epidemiologic research, this may translate into systematic error in the estimation of population parameters such as relative risk. The direction of bias may result in a dilution of observed effect (situations where the misclassification rates do not depend on exposure to the risk factors in question: non-differential misclassification bias) or an over- or underestimation of observed effect (in situations where the misclassification rates differ among the different risk factor exposure groups: differential misclassification bias).[10]

Until additional validation data for the CIDI Short Form are available, estimates deriving from its use must be considered vulnerable to misclassification bias. In studies where the full application of a structured diagnostic interview is feasible, this should be regarded as the preferred method of identifying cases of major depression. In situations where the use of a structured diagnostic interview is not feasible, the use of the CIDI Short Form may be an alternative. However, investigators choosing to use the CIDI Short Form should strongly consider application of a study design that can account for the possibility of misclassification bias. This generally entails the inclusion of an internal or (less preferable) external validation study into the data collection procedures so that

error rates associated with the imperfect measure can be estimated and accounted for in the analysis.[11]

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Uses and Limitations of Routine Hospital Admission/Separation Records for Perinatal Surveillance

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Abstract

This study examined the quality of data for delivering mothers and their newborns (April 1, 1984 to March 31, 1995) recorded by the Canadian Institute for Health Information (CIHI). The number of illogical and out-of-range values in the CIHI data were quite few; the occurrence of maternal and infant diseases estimated from CIHI data was quite similar to that in the literature; and major medical/obstetric complications recorded in CIHI were, in general, good predictors of adverse pregnancy outcomes. The authors conclude that CIHI data contain some of the information pertinent to perinatal surveillance that may be used to monitor maternal and infant health and to assess intrapartum care and hospital resource utilization. To adequately monitor and analyze patterns of health determinants and outcomes in all pregnant women and their infants in Canada, additional data collection mechanisms are needed to cover all recognized pregnancies and to collect antenatal and postpartum information and more detailed information on intrapartum care.

Key words: *Canada; data collection; epidemiologic methods; infant, newborn; mothers; pregnancy outcome*

Background and Introduction

The Bureau of Reproductive and Child Health in the Laboratory Centre for Disease Control, Health Canada, is leading the development of the Canadian Perinatal Surveillance System (CPSS). This new surveillance system will monitor and analyze the patterns of health determinants and outcomes in all pregnant women and their infants in Canada, in order to improve the effectiveness and efficiency of clinical perinatal care, public health practice and health policy making. The Bureau has investigated and evaluated existing databases to see if they could serve the needs of a national perinatal surveillance system.

In this evaluation, hospital admission/separation records collected by the Canadian Institute for Health Information (CIHI) [formerly Hospital Medical Records Institute (HMRI)] seemed an attractive source of data for perinatal surveillance because, at present, most of the births in Canada take place in hospitals. However, like other routine data sets, CIHI data are not designed and collected specifically for perinatal surveillance purposes. As a result, it would be natural for people to be sceptical about the quality and appropriateness of CIHI data for perinatal surveillance.

A special concern regarding CIHI data for perinatal surveillance purposes is that so far only some Canadian hospitals (about 78%) participate in the CIHI project. If the delivering mothers and their infants from these participating hospitals differ from those of non-participating hospitals, the results and conclusions based on analyses of data captured by CIHI may be biased.

Thus, we decided to undertake a study to assess the quality and appropriateness of CIHI data for perinatal surveillance. We abstracted the relevant information available on all delivering mothers and their newborns from the CIHI database for the period from April 1, 1984, to March 31, 1995, and systematically assessed the appropriateness of use and the limitation of these data for perinatal surveillance.

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Subjects

In order to assess the appropriateness of using CIHI data to monitor temporal trends, 11 years of CIHI data (fiscal years 1984/85 to 1994/95) were utilized (data presented here exclude every second year). Using the entire CIHI data set, we abstracted data on newborns by a field of "age unit" with a code of "NB" (indicating live births) or "SB" (indicating still births), and we abstracted data on delivering mothers with appropriate codes for "case mix group." Table 1 lists the case mix group codes used by CIHI to define obstetric delivering over the 11-year period.

TABLE 1

Case mix group codes used by CIHI to define obstetric deliveries

Time period	Case mix group	Description
1984/85 to 1989/90	502	Cesarean section with complications
	503	Cesarean section without complications
	504	Vaginal delivery with complications
	505	Vaginal delivery without complications
	506	Vaginal delivery with sterilization
	507	Vaginal delivery with other procedures
1990/91 to 1993/94	600	Vaginal delivery without complications
	601	Vaginal delivery with complications
	602	Vaginal delivery with sterilization
	603	Vaginal delivery with other procedures
	604	Cesarean section
1994/95	601	Repeated cesarean section with complications
	602	Cesarean section with complications
	603	Repeated cesarean section
	604	Cesarean section without complications
	606	Vaginal delivery with sterilization
	607	Vaginal delivery with other procedures
	608	Vaginal delivery after cesarean section with complications
	609	Vaginal delivery with complications
	610	Vaginal delivery after cesarean section
	611	Vaginal delivery without complications

Methods

The variables chosen for assessment were those available from CIHI, and they are important indicators or explanatory variables for the CPSS. Demographic and administrative variables, including infant sex, maternal age (derived by birth date and admission date), case mix group, neonatal in-hospital death, maternal and neonatal length of in-hospital stay, were coded by the CIHI manual. Variables derived from diagnoses were coded according to the ninth revision of the International Classification of Diseases (ICD-9),[1] and we re-grouped some of the diagnosis codes to meet perinatal surveillance purposes. Procedures were coded according to the Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures (CCP).[2]

Two aspects of the study variables were assessed.

- Whether and to what extent the sample from CIHI formed a representative sample for the whole country
- Whether the needed variables were available and valid in CIHI data

To accomplish the first part of the assessment, figures obtained from CIHI were compared with figures reported by Statistics Canada (based on birth certificates) for the same years. To assess the consistency of CIHI data over time, this comparison was carried out for the 11-year period.

To accomplish the second part of the assessment, several techniques were applied. First, we performed internal logic checks on certain variables. For example, we looked for obvious errors such as the sex of a delivering mother not recorded as female, the length of in-hospital stay for a still-birth newborn not equalling 0, a case mix group code for the delivering mother indicating cesarean section while the procedure code indicated vaginal birth or a case mix group code indicating a delivering mother had a cesarean section in a previous pregnancy but with no corresponding diagnosis code.

Secondly, we evaluated the range and extreme values for continuous variables to assess whether the ranges were reasonable. Both illogical and out-of-range values would have been possible because of human errors. What was important to know was how frequently these errors occurred in the CIHI data, and then to judge whether the measurements for these variables were reasonably valid.

Thirdly, we compared the frequency of relevant diagnoses with the literature. There will always be variations in disease incidence across populations, so we would not expect rates estimated from CIHI data to be exactly the same as those reported in the literature. However, if the difference was too large, the incidence of the particular disease might be invalid, and caution would have to be applied in the uses and interpretations of the CIHI data in perinatal surveillance.

Finally, we calculated the relative risk of major medical/obstetric complications with certain adverse outcomes. If the measurements of these medical/obstetric complications were valid, they could be used to predict the risk of certain adverse outcomes for which the causal relationships have been well established. We used cesarean delivery as the adverse outcome to assess the validity of measurement on maternal complications, and neonatal in-hospital death and prolonged length of in-hospital stay as the adverse outcomes to assess the validity of measurement on birth weight. Not only were these adverse outcomes relatively "hard" measures and their causal relationships with maternal and neonatal complications established,[3–5] but their validity had been assessed by our logical check and agreement analysis as well.

Results

The variables studied, their definitions and the assessment techniques used for each study variable are listed in Table 2.

About 72% of all deliveries in Canada were recorded by CIHI in fiscal year 1994/95. The CIHI coverage was lower in earlier years, and substantial interprovincial variation in participation was noted (Table 3).

Key statistics obtained from CIHI, namely maternal age, infant sex ratio, still birth ratio, frequency of multifetal pregnancy, cesarean delivery rate and low birth weight rate, were quite comparable with corresponding figures reported by Statistics Canada, indicating the CIHI cases form a reasonable representative sample of the national figures (Table 4). We have based our assessment on the clinical importance and consistency of the differences, rather than statistical significance, since trivial differences may be statistically significant because of the large sample size.

We found that illogical or unlikely outlier values (all irregular codes, such as a blank or a character for a numerical code) did occur in the CIHI data. However, the frequency of these values was extremely low (Table 5).

For most of the adverse pregnancy conditions and outcomes, especially those with less controversial definitions or diagnoses, we found the prevalence to be within a reasonable range of that reported in the literature (Table 6).

TABLE 2

Coding, definition and assessment technique used for variables selected for the current study

Variable name	Coding and definition	Logistic check	Range and extremes	Literature figures	Predictive validity
Maternal variables					
Age	CIHI manual: admission date—birth date		Yes	Yes	Yes
Maternal length of in-hospital stay	CIHI manual	Yes	Yes	Yes	Yes
Case mix group	CIHI manual	Yes			
Cesarean section	CCP[a]: 86	Yes		Yes	
Previous cesarean section	ICD-9: 6542, 6606	Yes		Yes	Yes
Breech presentation	ICD-9: 6522, 6696			Yes	Yes
Dystocia	ICD-9: Multiple[b]			Yes	Yes
Fetal distress	ICD-9: 6563			Yes	Yes
Severe preeclampsia and eclampsia	ICD-9: 6425, 6426, 6427			Yes	Yes
Gestational diabetes	ICD-9: 6488			Yes	Yes
Placenta previa	ICD-9: 6410, 6411			Yes	Yes
Abruptio placenta	ICD-9: 6412			Yes	Yes
Polyhydramnios	ICD-9: 657			Yes	Yes
Multifetal pregnancy	ICD-9: 651			Yes	
Infant variables					
Sex	CIHI manual	Yes		Yes	
Neonatal in-hospital death	CIHI manual			Yes	
Length of in-hospital stay	CIHI manual		Yes	Yes	
Still birth	CIHI manual	Yes		Yes	
Birth weight	CIHI manual	Yes	Yes	Yes	Yes
Respiratory distress syndrome	ICD-9: 769			Yes	

[a] CCP: Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
[b] 6600, 6601, 6602, 6603, 6604, 6608, 6609, 6610, 6611, 6612, 6614, 6619, 6620, 6621, 6622

TABLE 3

Number of deliveries recorded by CIHI as a percentage of all deliveries registered by Statistics Canada[a], by province, 1984/85–1994/95

Province	1984/85	1986/87	1988/89	1990/91	1992/93	1994/95
Newfoundland	98.6	99.7	95.4	100.0	93.4	93.0
Prince Edward Island	82.3	81.5	84.9	88.9	93.1	92.7
Nova Scotia	13.0	1.5	4.7	4.5	5.3	14.6
New Brunswick	0.0	0.0	99.6	98.9	100.0	100.0
Quebec	0.0	12.3	15.3	14.6	12.4	0.0
Ontario	99.4	100.0	81.5	100.0	100.0	100.0
Manitoba	0.0	0.0	0.0	48.1	71.6	70.7
Saskatchewan	83.0	84.9	0.0	88.7	92.3	94.4
Alberta	0.0	0.0	40.8	98.4	97.7	99.3
British Columbia	75.2	56.0	86.2	97.5	98.9	99.3
Northwest Territories & Yukon	0.0	0.0	61.7	76.8	71.8	81.6
CANADA	51.8	53.0	54.3	74.9	73.9	72.5

[a] Source: Health Statistics Division. Births and deaths, 1982–1994. Ottawa: Statistics Canada.

TABLE 4

Comparison of key statistics obtained from CIHI and those reported by Statistics Canada[a]

Statistic	Source of data	1984[b]	1986[b]	1988[b]	1990[b]	1992[b]	1994[b]
Maternal age (% <18 yrs)	CIHI	2.1	1.9	1.9	2.2	2.3	2.4
	Statistics Canada	2.1	2.0	1.8	1.9	2.1	2.1
Maternal age (% <20 yrs)	CIHI	6.6	5.7	5.9	6.4	6.4	6.8
	Statistics Canada	6.4	5.9	5.8	5.9	6.1	6.2
Maternal age (% >35 yrs)	CIHI	4.6	5.7	6.3	6.7	5.2	8.5
	Statistics Canada	4.1	4.7	5.5	6.1	6.9	8.1
Sex ratio (% male)	CIHI	51.4	51.1	51.4	51.2	51.1	51.4
	Statistics Canada	51.4	51.2	51.2	51.4	51.3	51.5
Multifetal pregnancy (%)	CIHI	0.8	0.9	0.9	0.9	1.0	1.0
	Statistics Canada	1.0	1.0	1.0	1.0	1.0	1.1
Still birth (%)	CIHI	0.6	0.6	0.6	0.6	0.6	0.7
	Statistics Canada	0.6	0.6	0.6	0.6	0.6	0.6
Low birth weight (%)	CIHI	5.4	5.4	5.3	5.6	5.5	5.8
	Statistics Canada	5.7	5.7	5.7	5.5	5.5	6.0
Cesarean delivery (%)	CIHI	19.9	20.4	20.3	19.3	18.3	17.7
	Statistics Canada	18.9	19.2	19.6	19.1	17.7	NA

[a] Sources: For cesarean delivery: Millar WJ, Nair C, Wadhera S. Declining cesarean section rates: a continuing trend? *Health Reports* 1996;8:17–24.
For others: Health Statistics Division. Births and deaths, 1982–1994. Ottawa: Statistics Canada.
[b] CIHI data are based on fiscal years, i.e. 1984/85 to 1994/95.
NA: Not available

Our calculations of relative risk suggested that major maternal complications and indications coded by CIHI were strong predictors of cesarean delivery and that low birth weight recorded by CIHI was a strong predictor of neonatal in-hospital death and prolonged length of in-hospital stay (Tables 7A and 7B).

Discussion

Whether and to what extent a routine data set can be used for disease surveillance depends on the availability of study subjects and of variables pertinent to the purpose of a particular surveillance project, as well as the validity of measurement of the variables recorded in that data set. In the following sections, we explore the potential uses and appropriateness of the uses of CIHI data for perinatal surveillance by discussing our assessment of the performance of CIHI data with respect to the three aspects.

Availability of Study Subjects for Perinatal Surveillance

Many surveillance projects have difficulty in clearly defining their study subjects; however, the situation is better for perinatal surveillance. If we focus our surveillance on births, we can define study subjects without much difficulty. Routine hospital records such as those of CIHI then become an attractive data source for perinatal surveillance because, up to now, most births in Canada occur in hospitals. Although CIHI recorded only about 72% of all deliveries and participation rates varied across provinces and over time, we feel this sample may still be quite representative of all births in Canada, based on our comparison of key statistics from CIHI with Statistics Canada's figures (which are based on all births in Canada).

On the other hand, correctly identifying delivering mothers and newborns from CIHI data can

pose problems. Because the CIHI system is designed to collect data on all hospital admissions/separations and because there is no single specific field reserved for births, caution should be applied in choosing the appropriate variable(s) to define delivering mothers and newborns.

Diagnostic and procedure codes have been used frequently to select study subjects from CIHI data for epidemiologic studies,[7–9] since seeking treatment (either medical or surgical) for a particular disease is usually the sole reason for hospital admission. However, diagnostic and procedure codes are not appropriate for subject selection in perinatal surveillance. Because pregnancy is normally a physiological rather than pathological process, most of the delivering mothers and their newborns have no disease and need no treatment. As a result, they are not assigned any diagnostic or procedure code and therefore cannot be picked up by the ICD-9 or CCP codes.

It seems that the codes we used to select study subjects, namely age unit codes of "NB" and "SB" for newborns and case mix group codes for delivering mothers, are appropriate here. For example, the selection of a newborn would be incorrect if the admission date of the newborn was prior to his/her birth date, and the selection of a delivering woman would be incorrect if her gender was not recorded as female or her age was too old or too young. Neither case occurred according to our selection criteria.

TABLE 5

Definition and frequency of illogical or unlikely outlier values for selected study variables, data from CIHI, 1994/95[a]

Variable name	Definition for illogical or unlikely outlier values	Frequency (per 100,000 records)
Mother's sex	Not equal to female	0.0
Infant's sex	Neither male nor female	14.3
Still birth (infant's file)	LOS[b] not equal to 0 days	0.0
Neonatal length of in-hospital stay (live births)	<1 or >365 days	1.0
Birth weight	<250 or >6000 grams	23.0
Maternal age	<13 or >50 years	1.0
Maternal length of in-hospital stay	<1 or >365 days	1.0
Cesarean section	CCP[c] and CMG[d] codes conflicting	4.8
Previous cesarean section	ICD-9 and CMG codes conflicting	13.6

[a] All irregular codes, such as a blank or a character for a numerical code, were considered illogical or unlikely outlier values.
[b] LOS: Length of in-hospital stay
[c] CCP: Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
[d] CMG: Case mix group

TABLE 6

Comparison of prevalence of major adverse pregnancy conditions and outcomes estimated from CIHI (1994/95 data) with that reported in the literature

Adverse condition/outcome	% estimated from CIHI	% reported in literature	Reference
Maternal age <18 years	2.4	2.1	Statistics Canada[a]
Maternal age >35 years	8.5	8.1	Statistics Canada[a]
Previous cesarean section	10.1	7.2[b]	Reference 6
Breech presentation	3.9	3.0–4.0	Reference 3
Dystocia	17.5	12.0	Reference 3
Fetal distress	10.6	Open[c]	Reference 3
Preeclampsia and eclampsia	0.6	0.1–5.0[d]	Reference 3
Gestational diabetes	2.9	1.0–3.0	Reference 3
Placenta previa	0.4	0.3–0.5	Reference 3
Abruptio placenta	1.2	0.7	Reference 3
Polyhydramnios	0.4	0.1–1.7	Reference 3
Multifetal pregnancy	1.0	1.0	Statistics Canada[a]
Fetal death	0.7	0.6	Statistics Canada[a]
Birth weight <2500 g	5.8	6.0	Statistics Canada[a]
Birth weight >4000 g	12.7	12.2	Statistics Canada[a]
Respiratory distress	1.2	1.2	Reference 3

[a] Health Statistics Division. Births and deaths, 1994. Ottawa: Statistics Canada.
[b] Figure for 1982, which is expected to be lower than the current one.
[c] Reference 3 described the various difficulties in diagnosing this condition, but did not give a reference percentage
[d] Percentages obtained from CIHI were restricted to severe preeclampsia and eclampsia (ICD-9: 6425, 6426, 6427), whereas no such restriction was applied to those cited from Reference 3.

TABLE 7A

Relative risk of the presence of various maternal complications/indications (versus their absence) with the occurrence of cesarean delivery, based on 1994/95 CIHI data

Complication/indication	Relative risk	(95% confidence interval)
Previous cesarean section	5.67	(5.59–5.75)
Breech presentation	5.09	(5.02–5.16)
Dystocia	1.98	(1.95–2.02)
Fetal distress	2.19	(2.15–2.23)
Severe preeclampsia/eclampsia	3.26	(3.12–3.40)
gestational diabetes	1.61	(1.56–1.67)
Placenta previa/abruptio placenta	3.04	(2.95–3.13)
polyhydramnios	2.37	(2.21–2.54)
Mother's age >35 years	1.46	(1.43–1.50)

TABLE 7B

Predictability of birth weight on neonatal in-hospital death and length of in-hospital stay (LOS), based on 1994/95 CIHI data

Birth weight	Neonatal in-hospital death (%)[a]	Mean LOS in days[b] (SD)	LOS[b] <2 days (%)	LOS[b] >4 days (SD)
500– <1500 g	15.17	18.0 (5.5)	4.7	90.5
1500– <2500 g	0.71	7.8 (6.3)	6.1	55.6
2500–4000 g	0.05	2.6 (1.6)	19.0	8.6
>4000 g	0.05	2.8 (1.6)	14.9	11.0

[a] Only live births were included.
[b] Only live newborns who were discharged alive from the birth hospitals without transferring to other institutions were included.
SD: Standard deviation

Availability of Variables for Perinatal Surveillance

The CPSS Steering Committee has developed a preliminary list of indicators and explanatory variables that should be collected and analyzed for the Canadian Perinatal Surveillance System.[10] The CIHI data contain some of these indicators and explanatory variables, with concentration on administrative variables and diagnoses. (It should be pointed out that the list in Table 2 is not exhaustive.)

Some variables are not explicitly recorded by CIHI, but can be derived by various techniques. For example, by matching delivering mothers with information on the same individuals contained in other CIHI data (CIHI data after discharge of the mothers), rates of maternal re-admission could be calculated and analyzed by time period, region or reason for re-admission. The ability to ascertain re-admission is a unique feature of CIHI data. Once delivering mothers are discharged from hospitals, they are no longer obstetric patients and can be re-admitted to hospitals as any other type of patient, such as medical, surgical or psychiatric patients. Any system with no full coverage of various hospital services or with no complete individual follow-up would miss a large proportion of re-admission cases.

It should be noted that there are large gaps between the CPSS requirements and CIHI data in terms of availability of variables for perinatal surveillance. First, antenatal information, including antenatal care and maternal antenatal exposure information, is missing from CIHI data. Second, no information is collected by CIHI on patients after their discharge. Third, many important operative or anesthesia procedures and medication, such as forceps, induction, epidural anesthesia, etc., are not available in the CIHI data (at least for the copy that Health Canada receives). Fourth, maternal and infant data are recorded separately by CIHI, which makes an analysis of the relationship between maternal characteristics and infant's outcomes difficult.

Some of these problems with CIHI data can be remedied by more intensive data collection effort. For example, length of gestation, anesthesia procedures, forceps usage and inductions are routinely recorded (and parity will soon be recorded) by Med-Echo, a similar hospital discharge database in Quebec. Data linkage can provide some remedies for CIHI data as well. For example, a matching between delivering mothers and their own infants may allow an analysis of the relationship between maternal characteristics and infant's outcomes, although there is no guarantee of perfect matching here. However, some of the problems cannot be fixed without additional data collection and information gathering.

Validity of Variables Recorded by CIHI

If the measurement of a study variable is not valid, the study result and conclusion can be seriously compromised. As a result, our assessment of the quality of CIHI data focuses on the validity of measurement of variables recorded by CIHI.

For some of the "soft" diagnostic variables, large variability is expected. For example, what amount of fluid should be used as the criterion to diagnose "oligohydramnios" or "polyhydramnios," or what criterion should be used to distinguish "severe" from "mild" preeclampsia has been and will continue to be controversial.[3] If caused by random errors, the great variability of these "soft" diagnostic variables may lead to non-differential misclassification.

Systematic bias may also be introduced when comparing rates based on these diagnoses for different groups of pregnant women (e.g. across time periods and geographic areas). For example, if the blood glucose screening for pregnant women is more intensive and the diagnostic criteria for gestational diabetes are more lax in recent years than in previous years, or if the screening is more intensive and the diagnostic criteria are more lax in certain provinces, the apparent temporal trends or interprovincial variations in diagnosed gestational diabetes may reflect differences in screening aspects and diagnostic criteria rather than true incidence. As a result, caution should be applied in the interpretation of temporal trends and geographic area variations of rates and distributions for these variables, with particular attention being paid to variability in criteria and intensity of diagnosis.

For most of the demographic and administrative variables and some of the "hard" diagnostic variables (including maternal age, infant's sex, birth weight, length of in-hospital stay, case mix group, cesarean delivery and previous cesarean delivery), it seems that the records in CIHI data are quite valid. As shown in Table 6, illogical and unlikely outlier values for these variables are very few. Logical and within-range values can be invalid as well. For example, it would be "logical" (i.e. the sort of response that would fit the data field) but invalid if a female infant was recorded as male, a length of in-hospital stay of 1 day recorded as 10 days or a birth weight of 500 grams recorded as 5000 grams. However, it is a general tendency that illogical and unreasonable values are less frequently observed in data sets with good quality.

The validity of the variables studied in the CIHI data could also be judged by the similarity of their rates and distributions with those in the literature and by their strong predictability for adverse outcomes. Tables 7A and 7B showed that history of previous cesarean section and breech presentation were strong predictors of cesarean delivery while dystocia and fetal distress were weak predictors of cesarean delivery, and very low birth weight and low birth weight were strong predictors of neonatal mortality and morbidity (as measured by prolonged stay in hospital). These findings are very consistent with the related literature.[3–6]

Conclusion

CIHI data contain some of the information pertinent for perinatal surveillance, with concentration on administrative variables and diagnoses. Meticulous analysis of these data may generate results that could be applied to improve intrapartum care, hospital resource utilization, and maternal and infant health. To meet the goal of the Canadian Perinatal Surveillance System to monitor and analyze patterns of health determinants and outcomes in all pregnant women and their infants in Canada, additional data collection mechanisms are needed to cover all recognized pregnancies and to collect antenatal and postpartum information and more detailed information on intrapartum care. Development of valid data linkage mechanisms is also needed.

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A Survey of the Training of Canadian Health Professionals to Counsel against Smoking

Roger Thomas

Abstract

Canadian schools that train health professionals were asked to evaluate the amount of teaching of counselling skills to prevent clients from starting smoking or to help them quit, the topics covered, the knowledge and counselling skill level of their graduates and whether an integrated smoking counselling program was needed for their school. Responses to a questionnaire were received from the Assistant Dean of Undergraduate Studies, the Assistant Dean of Postgraduate Studies and/or the Postgraduate Program Director of 165 professional schools or departments of 283 contacted (58% response rate). For those schools that replied that they taught counselling about smoking, they devoted more hours in the curriculum (range 1–11 hours) to education about the diseases caused by smoking than to counselling children or adults against smoking or helping smokers to quit. Nursing schools tended to have integrated health education curricula, and it was therefore difficult for them to identify the hours devoted exclusively to counselling about tobacco. Few of the deans or program directors of any of the professional schools estimated the knowledge and counselling skills of their graduates as superior, and a majority felt that an integrated smoking counselling curriculum was needed for their school.

Key words: *Canada; counselling; education, professional; smoking; tobacco*

Introduction

Smoking remains a key threat to health in Canada. Health Canada's 1994 Survey on Smoking in Canada[1] found that 30% of the Canadian population over age 15 smoked regularly (31% of males, 29% of females). Among those aged 15–19, 28% smoked; among those aged 20–24, 38% smoked; among those aged 25–64, 33% smoked; and among those aged 65 and over, 15% smoked. The average number of cigarettes smoked per day by females was 17, and by males, 20.

By age 10, 30–50% of children will have experimented at least once with a cigarette, with initiation rates accelerating rapidly thereafter.[2] On average, one cigarette will be smoked each week by 1–3% of 10-year-olds,[3] rising to 20–24% at age 15.[4] Children who begin smoking at age 12 or younger are more likely to be regular and heavy smokers.

Purpose and Methods of the Survey

Since health professionals have an important role to play in their clients' smoking behaviours, a survey was devised to assess how well trained they are to counsel against smoking. Specifically, the purpose of the survey was to ascertain if counselling about smoking was offered in Canadian professional schools; how many hours were offered; what topics were covered; whether a specific counselling program "Guide your Patients to a Smoke-free Future" was used; what level of knowledge and counselling skills graduates had; and whether the respondents thought an integrated counselling curriculum on smoking was needed for their school.

Finance was available only for a mailed survey. Because the survey included all provinces, on-site visits to all professional schools would have increased the costs of the survey substantially. To encourage response, a one-page questionnaire (see Appendix) was designed that could be completed in a few minutes.

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After an initial mailing and a further two contacts either by telephone or mail in January and February 1997, responses were received from a total of 165 professional schools or departments of the 283 contacted (58% response rate). Nine schools of undergraduate medicine, 30 departments of postgraduate medicine, 93 schools of nursing, 9 schools of pharmacy and 24 departments of psychology replied. It is a sign of the stringent financial situation of professional education that 15 colleges of nursing wrote that they would not formally reply because they were either in the process of closure or anticipating closure. The administrative arrangements to contact the colleges of dentistry were not completed in time for the survey, and their views will be included in any subsequent survey.

Results

The Provision of Counselling in Canadian Professional Schools

The percentages of schools not able to reply if counselling was provided in their curriculum varied from 55% for undergraduate medicine to 22% for psychology and 11% for some aspects of counselling in pharmacy (Table 1).

The professional schools who replied spent from one to eleven hours over the entire program discussing diseases caused by smoking. However, many schools had no smoking counselling curriculum, and the average number of hours devoted to counselling among those who replied and stated a specific number was only two.

Many nursing schools had integrated health education curricula for which it was not possible to be specific about the number of hours devoted to counselling about smoking. Comments were made regarding this integration into several courses, often problem-based, dealing with general health education and counselling or discussion of the many medical conditions known or believed to be related to smoking. Nevertheless, six schools of nursing reported more than 20 hours of curriculum time in integrated counselling that included smoking; a further two reported 20–30 hours; three, 40–50; and one, 80 hours.

For some nursing schools the counselling on smoking was in elective courses, for example, "15 hours in 1st and 2nd year, as part of elective therapeutic course (45 hours), if area of interest."

One nursing school indicated there could be ethical problems in teaching anti-smoking viewpoints.

> *Addiction to smoking is cited as a pathology factor. A healthy lifestyle is recommended, but there are no specific approaches. Intervention as you seem to see it enters into conflict with values and can be perceived as total intervention. The dilemma of training versus indoctrination. [translation]*

TABLE 1

The provision of counselling about smoking in Canadian professional schools

Deans or program directors		Undergraduate Medicine	Postgraduate Medicine	Nursing		Pharmacy	Psychology
Number contacted		16	52	162		9	44
Number replying		9	30	93		9	24
Question	Response type			English	French		
Education about diseases caused by smoking	DK (%)	55	40	18	18	22	13
	Hours[a]	6	4	8	11	4	1
Counselling children against smoking	DK (%)	55	43	41	44	22	21
	Hours[a]	0.25	0.9	0.7	1.4	0.25	0.5
Counselling adults against smoking	DK (%)	55	40	32	43	11	20
	Hours[a]	1	1.2	2.7	2	1.1	0.7
Helping smokers quit	DK (%)	55	40	50	43	11	20
	Hours[a]	0.75	1.8	0.5	1.6	1.2	1.7

Only one nursing school commented on the rate of current smoking among nursing students.

> *Many nursing students continue to smoke. We have a lot of generic health counselling that can be applied to smoking.*

Some nursing schools preferred to provide conceptual tools rather than specific counselling skills.

> *Nursing education does not teach disease-specific content—concepts are the focus instead, i.e. cell aberration, oxygen deprivation, ischemia, etc. Counselling, again, does not tease out content-specific material re smoking/anti-smoking–generic.*

> *We believe in the concept of teaching principles, not a larger number of facts. There are courses in health promotion and principles of teaching in which smoking along with other diseases/habits are included. I believe we include all the principles and basic knowledge.*

TABLE 2

The provision of specific counselling approaches

Question	Response	Ugrad Med	Pgrad Med	Nursing		Pharm	Psych
				Eng	Fr		
Gender-specific approaches are used	Yes	44	27	32	9	0	8
We use the "Guide Your Patients to a Smoke-Free Future"	Yes	11	13	3	5	0	4

Specific Approaches to Counselling

Effective counselling against smoking requires at least culture-specific and gender-specific materials to interest the clients. Of those schools that had a curriculum for counselling about smoking, the percentage using a gender-specific approach ranged from 44% for undergraduate medicine to 0% for pharmacy (Table 2). The survey asked whether the counselling program "Guide your Patients to a Smoke-Free Future" (from the Canadian Council on Smoking and Health, the Canadian College of Family Physicians and the Canadian Medical Association) was used: less than 10% of the professional schools used this program.

Opinions about Students' Counselling Skills

One third of the assistant deans of medical schools could not assess their students' counselling abilities (Table 3). About half the assistant deans thought that their students

TABLE 3

Opinions about students' counselling skills

Question		Undergraduate Medicine	Postgraduate Medicine	Nursing		Pharmacy	Psychology
Students' skills in counselling about smoking at completion of program				English	French		
	Response	%	%	%	%	%	%
Knowledge	No reply	22	30	9	6	0	21
	Minimal	11	3	45	10	44	50
	Basic	44	30	18	34	22	17
	Satisfactory	11	30	23	40	33	8
	Superior	11	7	5	9	0	4
Counselling practice	No reply	33	33	27	7	0	25
	Minimal	33	7	55	30	44	38
	Basic	33	23	0	35	22	25
	Satisfactory	0	37	18	21	33	4
	Superior	0	0	0	6	0	8

had minimal or basic skills. None of the assistant deans of medicine, francophone nursing or pharmacy thought their students had acquired superior counselling skills, and only 6% of the anglophone nursing schools and 8% of the psychology schools thought their students had superior practice skills.

Opinions about the Need for Integrated Counselling Curricula

The percentage of assistant deans expressing an opinion about the need for an integrated counselling curriculum ranged from 78% of the assistant deans of undergraduate medicine to 100% of the assistant deans of pharmacy (Table 4).

On average, the assistant deans of all schools agreed that there was a need for an integrated counselling curriculum (scores varied from 1.9 to 2.6, where 1 = strong need, 3 = neither agree nor disagree, and 5 = no need), but there was a wide variety of opinion within each discipline.

The assistant deans of two undergraduate medical schools focused on how integrated medical curricula functioned.

> *I am not sure that the integrated curriculum needs to be specifically aimed at tobacco, but we need to improve our teaching around counselling and behavioural change—addictions, tobacco, other drugs.*

> *We have a problem-based curriculum where discussions about specific problems occur in groups of seven students. The amount of time spent in each tutorial group can vary significantly.*

Some assistant deans of postgraduate medicine felt that counselling was most likely to take place in primary care disciplines.

> *Psychiatry deals with major illnesses and syndromes; this may be more appropriate to primary care settings.*

> *Depends on which program—family medicine very well prepared, surgery less well, since they tend not to be involved in counselling.*

The assistant deans of pharmacy noted a specific focus in their programs and preferred a more integrated approach.

> *We are currently using the "Butting Out for Life Program." While we "teach" about helping smokers to quit, it is very product-focused (i.e. nicoderm, etc.), not patient-focused. Resources to assist in motivational counselling would be helpful.*

> *Emphasis to date has been on smoking cessation aids, how they work, patient counselling and monitoring. An integrated curriculum would be very useful, especially if it incorporated case work and practice in counselling patients.*

Assistant deans of psychology noted the effect that specific educational programs had on the amount of counselling received.

> *The interns who go through health psychology and perinatal rotations receive more smoking cessation [instruction] than those in other rotations (i.e. adult clinical, neuropsychology).*

TABLE 4

Opinions about the need for integrated counselling curricula

Question	Undergraduate Medicine	Postgraduate Medicine	Nursing		Pharmacy	Psychology
			English	French		
There is a need for an integrated curriculum about	(1= strongly agree, 5 = strongly disagree)[a]					
Diseases caused by smoking	2.6	2.6	2.2	1.9	2.2	2.6
Counselling children against smoking	2.0	2.3	2.4	1.9	1.9	2.4
Counselling adults against smoking	2.0	2.3	2.2	2.0	2.1	2.6
Helping smokers quit	2.1	2.3	2.2	2.0	2.4	2.0
No reply	22%	18%	9%	12%	0%	16%

[a] The averages are computed only for those who replied. A rating of 1 means a strong perceived need for an integrated counselling curriculum, 5 means no perceived need.

We are an internship setting, primary work is with children. Some students, if interested, can receive specialized training in area. The role of psychology is better suited to developing prevention and treatment programs.

The assistant deans of psychology also were interested in integrated curricula.

If you have curriculum materials, please send them. I would like to raise this with the instructors, and at least make modules available in our training clinics.

More general strategies and interventions such as cognitive behavioural change procedures are taught and could be applied easily to the problem of smoking.

A workshop on this topic could be integrated into our clinical seminar series.

Our patients are chronic psychiatric patients and very heavy smokers.

Only one assistant dean (of psychology) mentioned ongoing research.

We have a reasonable protocol ongoing to evaluate a cognitive-behavioural, manual-based smoking cessation program. Should prove to be effective.

The comments on the surveys suggest that those schools (such as medicine and nursing) that have moved to problem-based curricula have thereby given their students more freedom to explore issues that interest them, but also rendered the assistant deans less certain of what material is being covered in each tutorial group. Those disciplines (such as psychology) with a structure consisting of courses for which students register indicate more ability to introduce new material into the curriculum via course or module offerings.

Review of the Literature

The Effectiveness of Interventions by Physicians

Interventions by physicians to help patients to quit smoking have been shown to be effective. The American *Guide to Clinical Preventive Services*[5] and the *Canadian Guide to Clinical Preventive Health Care*[6] both assess the evidence for counselling against smoking as being of "A" (excellent) quality.

A meta-analysis of randomized controlled trials of nicotine replacement therapies (NRTs), which summarized the results for 18,000 patients, showed that for the longest duration of follow-up available (usually 12 months), 19% of those allocated to NRT and 11% of controls were abstinent, a 71% (95% confidence interval [CI] = 56–87%) increase in the odds of abstinence with NRTs.[7] For trials that provided high-intensity support, the probability of not smoking at 6–12 months was 19.7% (95% CI = 18.7–20.6%), compared to 10.5% (95% CI = 9.9–11.1%) for those that used low-intensity support. However, the trials using transdermal nicotine patches showed no significant difference in abstinence if high-intensity support was provided.

A meta-analysis of 94 randomized controlled trials of programs to prevent adolescent smoking or encourage smokers to quit identified 48 studies with acceptable methodological quality.[8] Programs with social reinforcement, social norms and developmental orientations had significant positive effects, but those with rational (factual) orientations did not. The number of sessions of counselling was related to larger effect sizes.

Identifying the Smokers in a Practice

For counselling to be effective, studies have shown that several elements must be present. Physicians need to receive training to enquire about the smoking status of their patients and passive smoke; ask about readiness to quit and past quitting attempts; ask about smoking history and Fagerström tolerance level;[9,10] encourage smokers to set a date to quit; offer counselling, self-help materials and nicotine replacement therapy; record the counselling and cessation plan in the chart; set up follow-up appointments; and organize their offices and staff so that patients receive a comprehensive program.

Health professionals need training in regularly identifying the smokers in their practices. A study of family physicians in New Brunswick found that they were aware of only about 20% of the adult smokers in their practices.[11]

A 1992 survey in Connecticut reported that 48% of family physicians, 38% of pediatricians and 26% of dentists were able to estimate the smoking prevalence in their patients aged 12–18.[12] Their estimates were 30–50% below national rates. In addition, 24% of the family physicians, 20% of the pediatricians and 8% of the dentists reported "always" counselling 10–12-year-olds about smoking; these percentages increased to 51%, 48% and 9%, respectively, for 16–18-year-olds.

A questionnaire survey of 2095 family physicians in Indiana found that 86% asked new patients if they smoked and 23% asked about exposure to passive smoke.[13] Twenty-eight percent used a formal smoking program, but only eleven percent considered their counselling skills about stopping smoking to be excellent.

In a University of Ottawa family medicine clinic, the smoking status was recorded in the chart for only 12% of the patients aged 15–65. A study found that recording could be increased by 26% with a 15-second enquiry by a physician (at an average cost per percentage point improvement in recording of $7.37 CAN), by 37% with a mailed letter ($61.80) and by 44% when a nurse telephoned ($22.03).[14]

Offering Counselling about Smoking

Health professionals also need training in regularly asking smokers if they wish to quit and in offering therapy. Physicians tend to enquire more about smoking with patients who smoke more cigarettes per day or who have more severe health problems, or where smoking affects prescribing (e.g. for contraceptives).

The US Centers for Disease Control and Prevention conducted the National Health Interview Survey—Health Promotion and Disease Prevention Survey in 1991 among people aged 18 or over.[15] Of the estimated 51 million smokers, 36 million reported at least one visit with a physician in the preceding year, and 13 million (37% of smokers) received some advice during that visit to quit smoking. Those who smoked more and made more visits to physicians were more likely to receive advice to quit: 45% of those with 4 or more visits and 41% of those who smoked 15–24 cigarettes per day were advised to quit. The proportion of smokers ever advised to quit was 61%. Physicians reported a higher rate of giving advice to quit (52–97%) than the survey estimate, which may be due to overestimation on their part or to forgetting of advice on the part of survey respondents.

In the Stanford Five-City Project, 51% of smokers in 1989/90 said they had never been advised by a physician to quit, and only 3.6% of ex-smokers said they had been helped by a physician to quit.[16] Thirteen percent of the smokers aged 13–17 were advised to quit, whereas the proportion was sixty-nine percent for smokers aged 50–74. Thirty-five percent of those who had visited the physician once that year and sixty percent of those with more than 6 physician visits said that they had ever been advised to quit.

In a sample of Michigan residents over age 18, 44% reported ever being advised by a physician to quit smoking (30% of the males and 46% of the females aged 18–34). Eighty percent of the males and sixty percent of the females who had suffered a heart attack had been so advised also.[17]

A telephone survey of first-year college students in Arizona found that 89% had visited a physician in the past year.[18] Among these, 31% of the females and 21% of the males remembered being asked if they used tobacco (17% of the females and 19% of the males were smokers).

In California, a telephone survey of 24,296 patients revealed that physicians tended to offer advice to those smokers who were older, smoked more and were in worse perceived health.[19]

A study of family physicians in Nebraska used the Nebraska Academy of Family Physicians' membership list (comprising 90% of all physicians practising in Nebraska) as a sampling frame. The study planned to choose one practice from each of 12 types, based on practice type (solo versus group), physician's sex and location (frontier, rural, urban).[20] Eleven practices were each studied in a 2–3-day site visit, and the conclusions were that little advice was given to prevent the onset of adolescent smoking; the responsibility for identification, documentation, counselling and follow-up of smokers lay solely with the physicians; counselling was basic and consisted of advice to quit, offering NRT and tips for changing habits; no packages such as the American Academy of Family Physicians' smoking cessation kits were used; and none of the physicians were optimistic about change.

Training Physicians to Offer Counselling and Organize Their Offices for a Comprehensive Program

A randomized controlled trial with 97 residents in internal medicine and 15 faculty general internists offered them a one-hour lecture or personal instruction on the consequences of smoking, the benefits of quitting and evidence that NRT and advice by physicians can be helpful in quitting. Those who completed a questionnaire and received a one-hour lecture on cessation asked 41% of their patients about smoking, those with a fluorescent sticker on the chart offering 10 free packets of nicotine gum asked 84%, those with two fluorescent stickers on the chart asking about smoking and a quitting date asked 75%, and those with all three stickers asked 95%.[21] After one year, 2.7% of the control group had quit smoking, 8.8% of the group offered nicotine gum, 15% of the group who received reminders and 9.6% of the group who received reminders and gum. There were no statistically significantly different results between the three intervention groups, but the differences between the control group and the three experimental groups were significant ($p < 0.05$).[22] The physicians in the intervention groups spent significantly more time counselling against smoking.

In a non-randomized trial in 10 clinics near Minneapolis, Minnesota, nurse-educators made an average of 6 site visits, 24 phone calls and 6 mailings per practice site to offer smoking cessation training and assistance to the practice personnel. One staff member from each practice attended one workshop, and 13 of the 142 primary care physicians attended a workshop. In these 10 clinics, the proportion of patients asked about tobacco rose from 23% to 40%, compared to a change from 22% to 26% in 8 control clinics in Wisconsin ($p < 0.05$).[23] After the intervention, 41% of the physicians in the experimental clinics asked smokers to quit, compared to 26% in the control clinics.

Another study offered pediatricians a 2-hour seminar (39% of the 28 attended) and a reminder and chart documentation system for enquiring about passive smoke. Interviews with parents and chart reviews ascertained that screening for the presence of passive smoke increased from 17% to 32% ($p < 0.03$), and counselling to prevent parental smoking rose from 19% to 46% ($p < 0.03$).[24] However, documentation of the enquiry in the chart only increased from 2% to 6%, and of counselling, from 4% to 6%.

By 1995, the BC Doctors' Stop Smoking Program had recruited 655 general practitioners to implement a systematic approach to intervention in tobacco use. Ninety

percent of the participating physicians stated that they regularly asked patients who smoked whether they were ready to stop. It was estimated that 4700 smokers had been helped to quit and 135,000 had received counselling and follow-up through the efforts of these physicians and other physicians who implemented part of the program.[25] Smokers in a survey in British Columbia said that if they chose assistance to stop smoking (they could choose more than one method), 44% preferred NRT; 33%, a program offered by their physician; 20%, a program by another health professional; 15%, booklets or videotapes; and 23% did not wish to use any of the above methods.[25]

Orthodontists in Kansas were trained to give prescriptions advising against smoking to their patients aged 10–18. For the first year the average prescribing rate was 66%, and, in a multiple regression analysis, 20% of the variance in prescribing was explained by receiving praise from patients and knowing that the prescriptions were being tracked. In the second period the prescribing rate was 73%, and 23% of the variance was explained by receiving praise and having received instruction on how to apply operant learning theory in counselling patients.[26]

In the only study located for this article of educating health professionals to give smoking cessation advice that made power computations to assess the sample size required to reduce the probability of Type II error, orthodontic offices in California were randomly assigned to receive 1.5 hours of training based on the National Cancer Institute's tobacco cessation workshops. The effect on initiation of smoking within the next 30 days was non-significant.[27] However, for adolescents who received 4–6 prescriptions against smoking, the odds ratio (OR) of beginning smoking within 30 days was 0.76 (95% CI = 0.62–0.94) and for those receiving 7 or more prescriptions, the OR was 0.75 (95% CI = 0.59–0.95).

In a survey of 30 randomly chosen physicians' offices in each of 11 communities, those who responded (48% response rate) said that they offered smokers an intervention 70% of the time.[28] However, few had organized their staff to co-ordinate the smoking cessation program and provide reminders.

Physicians at the Kaiser-Permanente health maintenance organization in California were trained to give a 1- or 2-minute message to quit smoking, and nurses were trained to give a 30-minute behavioural counselling session and four 10-minute follow-up phone calls to patients who were hospitalized.[29] After 12 months, the patients randomized to the intensive therapy had higher smoking cessation rates (OR = 1.4, 95% CI = 1.1–1.8) than those randomized to usual care.

Training Medical Students and Residents to Offer Counselling about Smoking

A worldwide study of medical students in 1985 reported the following proportions of male students who said that they smoked: 41% in the former USSR, 35% in Japan, 19% in Europe and 0% in the USA (the highest proportions for females were 15% in Chile and 12% in both the former USSR and Europe).[30] The percentages of final-year medical students who stated they would "often" advise quitting to a patient with no smoking-related disease or complaint and who had not raised the subject were in these ranges: 19–43% in the former USSR, 15–60% in Europe and Asia, 20–41% in Africa and the Middle East, and 2–9% in Japan.

Training student and resident physicians to offer stop-smoking programs requires the same structure of counselling to ask about smoking status, offer therapy, arrange reminders and organize the office that is helpful for experienced clinicians in practice.

In Australia, a randomized controlled trial of teaching fifth-year medical students to give advice about stopping smoking assessed their performance on an 82-item rating scale. Those receiving audio feedback, peer feedback and video feedback significantly improved their advice giving and the behavioural strategies used compared to a control group.[31] The effect of giving advice on patients' smoking behaviour was not assessed.

A three-day workshop to improve the preventive health behaviours of general practice trainee doctors in Australia showed that questions about smoking were asked in 22% of consultations before the workshop.[32] Although the experimental group asked more questions about smoking status after the workshop ($p < 0.01$), two thirds of smokers still remained undetected and less than one in five were advised to stop smoking. The authors concluded that skills training needed reinforcement in clinical practice.

A study to ascertain if the US National Cancer Institute (NCI) *Guide to Preventing Tobacco Use During Childhood and Adolescence* could be incorporated into a pediatric residency found that parents reported that 37% of the residents who had received the classroom training asked about smoking, compared to 17% of those who had not received the training.[33] Of the residents who had received the NCI manual, 12% could not recall receiving it and only 38% said that they had read it.

A study of 15 residents in internal medicine in Lausanne showed that, after receiving a training program, enquiries about smoking increased from 68% to 77%; advice to quit, from 28% to 43%; and counselling about smoking cessation, from 10% to 25%, but provision of self-help materials only increased from 1% to 7% and arranging for follow-up visits only rose from 1% to 5%.[34] Although the patients' interest in quitting did increase, there was no actual increase of quitting in the following 12 months.

Thirty-five obstetric and family practice residents at the University of Vermont received training to implement a brief smoking counselling intervention with prenatal patients, which was followed by counselling with a smoking cessation counsellor.[35] Residents in the control group did not receive chart prompts to offer counselling. At

the first antepartum visit, 96% of the residents in the intervention group advised quitting, as did 94% of the control group residents. The percentages on the second antepartum visit were 91% and 52%, respectively ($p < 0.0001$).

Health checks given by nurses in five general practices in the Oxford Region were not associated with any changes in smoking behaviour.[36]

Offers of mailed self-help smoking materials and brief telephone interventions are not effective in stopping patients from smoking. At the University of California in Los Angeles, the Preventive Health Behavior Study of 2786 smokers among 15,004 female members of a health maintenance organization observed that mailing out self-help smoking cessation programs had no effect on readiness to stop smoking at 1, 6, 12 or 18 months.[37] A study using two 15-minute telephone calls to counsel against smoking resulted in a reduction in self-reported and cotinine-validated smoking after 6 months, but the effect had disappeared at 18 months.[38] There is, therefore, a need to train health professionals to ask about smoking status, identify those interested in quitting, provide NRT and counselling, and to organize their practices to provide materials, follow-up and reminders within an effective structure to maximize smoking cessation.

Conclusions from the Survey in Relation to the Literature Review

Many assistant deans are not able to define the number of hours of specific tobacco-counselling instruction given in their curriculum. For those programs that do state a number of hours, the range is 1–11 hours, and the average is about 2 hours over the entire professional curriculum. Because many nursing schools have integrated health counselling programs, it is not possible for many of them to identify to what extent counselling specifically about smoking is offered.

Of the assistant deans who have an opinion about the level of counselling practice skills among their students, about half rate the skills as minimal or basic. In only two types of school do ratings of superior occur (6% of anglophone nursing, 8% of psychology).

Effective smoking prevention needs to be gender and culture sensitive. This survey only inquired about gender-sensitive counselling, which varied from 44% for undergraduate medicine programs to 0% for pharmacy programs.

The assistant deans and program directors who replied concur that an integrated smoking counselling curriculum is needed.

Although this survey was limited to being one page that could be rapidly completed in order to ensure response, it is clear that those mandated to have an oversight of the educational curricula of their professional schools did not outline an integrated program of instruction to ensure that all their graduates would offer a comprehensive and effective smoking cessation program when in practice. Such a training program would ensure that all practising graduates ask about the smoking status and passive smoking status of all of their clients; ask about past smoking history and Fagerström tolerance levels;[9,10] ask about interest in quitting and past quitting attempts; set a quitting date; offer self-help materials, NRT and counselling; arrange follow-up visits and reminders; record the counselling and the therapy plan in the chart; and organize their offices and staffs to offer a comprehensive smoking therapy program to all patients.

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APPENDIX

QUESTIONNAIRE

Teaching Counselling Skills about Smoking

The students during their undergraduate years receive the following number of hours of education about:
(___ = please enter number; DK = don't know)

1. Diseases caused by smoking: DK 0 1 2 3 4 5 6 7 8 9 10 ___
2. Counselling children against smoking: DK 0 1 2 3 4 5 6 7 8 9 10 ___
3. Counselling adults against smoking: DK 0 1 2 3 4 5 6 7 8 9 10 ___
4. Helping smokers quit: DK 0 1 2 3 4 5 6 7 8 9 10 ___
5. We use the specific counselling program:

   "Guide Your Patients to a Smoke-Free Future" ☐ YES ☐ NO

   Gender-specific approaches are used ☐ YES ☐ NO

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6. After completing their undergraduate years the students' skills in counselling about smoking are:

Knowledge	**Counselling Practice**
___ minimal	___ minimal
___ basic	___ basic
___ satisfactory	___ satisfactory
___ superior	___ superior

In our curriculum there is a need for an integrated curriculum about:
(SA = strongly agree; A = agree; N = neither; D = disagree; SD = strongly disagree)

7.	Diseases caused by smoking	SA	A	N	D	SD
8.	Counselling children against smoking	SA	A	N	D	SD
9.	Counselling adults against smoking	SA	A	N	D	SD
10.	Helping smokers quit	SA	A	N	D	SD

Combining Qualitative and Quantitative Research Methods: Considering the Possibilities for Enhancing the Study of Chronic Diseases

Ann L Casebeer and Marja J Verhoef

Abstract

This paper discusses some of the underlying reasons why health researchers have historically had difficulty working collaboratively across qualitative and quantitative research paradigms and argues why it is imperative that researchers move beyond traditional adherence to particular methods of inquiry. Chronic illnesses are prime examples of conditions that by their very nature need to be studied from a combination of perspectives, using both qualitative and quantitative methods. We suggest that the success of health research on managing these conditions lies in the shared application of both qualitative and quantitative research perspectives, methods and tools. In addition, we argue that effective research into long-term chronic illnesses requires not only combined research efforts but also longitudinal programs of study, so that the experience of managing chronic conditions can be captured over time.

Key words: *Chronic disease; combined methods; longitudinal studies; qualitative research; quantitative research; research design*

Introduction

Individuals experiencing the symptoms of chronic illnesses often struggle to accept and live with a given condition long before the illness has been given a name and in advance of seeking treatment. Chronic diseases are usually diagnosed and named by physicians; this often leads to long-term treatment and monitoring of activities by a range of clinicians and other caregivers involved in the management of such conditions. In order to properly understand and cope well with chronic, long-term and often increasingly debilitating illnesses, a broad range of knowledge and understanding must be brought together over time to support both the quality and quantity of remaining life for the individual living with the disease.

In particular, research that helps extend our understanding of how best to manage such chronic diseases and corresponding illness experiences requires a broad range of perspectives and skills. Holman[1] delineates a clear need for incorporating qualitative inquiry into medical research by highlighting the case of chronic diseases. He concludes that "good medical research recognizes the complementarity and interpretation of quantitative and qualitative methods of inquiry."

Unfortunately, the ability to combine research expertise across traditional methodological boundaries is often thwarted. Qualitative and quantitative researchers often operate with a different set of assumptions about the world and ways of learning about it. These assumptions may be seen as mutually and inevitably irreconcilable. Researchers are often taught to master only one type of method and, so, become comfortable with their expertise in handling either quantitative or qualitative analysis, but not both. The result is that the two major approaches (qualitative and quantitative) are seldom combined and their respective strengths are ignored by adherents of each approach.[2]

A review of the chronic disease literature confirms the general trend to conduct either quantitative or qualitative studies, identifying a relative paucity of combined method designs. A review of MEDLINE citations for the period 1993 to September 1997 indicates that 305 quantitative studies of chronic diseases were published, while only 112 qualitative studies were published (providing numerical

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evidence, at least, of a continuing preference for quantitative analysis). In all, 47 papers citing both quantitative and qualitative techniques were referenced. Many of these studies, however, simply used qualitative diagnostic measurements within essentially quantitative, quasi-experimental designs or else included reviews of both qualitative and quantitative literature relevant to the chronic condition of interest. Only 13 could truly be categorized as combined method studies.

Whether this is evidence of an active debate or simply the existence of two separate tracks of research efforts, the use of one method or the other clearly remains the predominant approach to the study of chronic diseases. This trend mirrors the situation with respect to health research in general. The inherent danger in this strict separation of research perspectives is the likely production of incomplete results regarding the health problem being studied.

In an attempt to encourage the conduct of combined method analyses, this paper does the following.

- Discusses the usual distinctions made between qualitative and quantitative approaches to research
- Presents arguments for collaborating across traditional research traditions, describing how both qualitative and quantitative approaches can complement rather than compete with (or ignore) each other
- Explains, through the use of examples, why health research, in general, and the study of chronic diseases and illness experiences, in particular, require the sustained blending of qualitative and quantitative research methods

Describing Approaches

Quantitative research is defined as "the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect," and qualitative research is described as "the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships."[3] Reviewing these definitions of what is meant by quantitative versus qualitative research helps identify the reasons for the primarily separate use of each method and the continuing debate among researchers concerning the relative value of each approach. The arguments can be complicated and often are philosophical; however, they essentially make the following kinds of distinctions.

> *The word qualitative implies an emphasis on processes and meanings that are not rigorously examined or measured (if measured at all), in terms of quantity, amount, intensity, or frequency. Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry ... In contrast, quantitative studies emphasize the measurement and analysis of causal relationships between variables, not processes. Inquiry is purported to be within a value-free framework.*[4]

While it may be somewhat naive to delineate the differences between qualitative and quantitative research so definitively, it is helpful to begin to understand the nature of the debate by understanding commonly held divisions and basic definitions. The basic constructs for viewing what "scientific" research is too often divide researchers in the health field, where the clinical trial remains the gold standard against which all other research is bench-marked.[5] Unfortunately, these definitions tend to establish two separate and contrary schools of research, emphasizing the arguments commonly engaged in to justify the use of one or the other technique, rather than simply stating the varying positions and perspectives contained within qualitative and quantitative research paradigms.

The Usual Distinctions

Quantitative and qualitative research methods are most often associated with deductive and inductive approaches, respectively. Deductive research begins with known theory and tests it, usually by attempting to provide evidence for or against a pre-specified hypothesis. Inductive research begins by making observations, usually in order to develop a new hypothesis or contribute to new theory. Quantitative research is usually linked to the notion of science as objective truth or fact, whereas qualitative research is more often identified with the view that science is lived experience and therefore subjectively determined. Quantitative research usually begins with pre-specified objectives focused on testing preconceived outcomes. Qualitative research usually begins with open-ended observation and analysis, most often looking for patterns and processes that explain "how and why" questions.

When applying quantitative methods, numerical estimation and statistical inference from a generalizable sample are often used in relation to a larger "true" population of interest. In qualitative research, narrative description and constant comparison are usually used in order to understand the specific populations or situations being studied. As a result, quantitative research is most often seen as a method trying to demonstrate causal relationships under standardized (controlled) conditions. Conversely, qualitative research is usually seen as a method seeking better understanding of some particular, natural (uncontrolled) phenomenon. A summary of the kinds of distinctions often made concerning the use and value of both methods is provided in Table 1.

The nature of the general theoretical debate, then, is characterized by fundamentally different understandings or beliefs about scientific research, in particular, and the world, in general. Adherence to different and separate paradigms can trap researchers into believing that there is only one true "scientific" way to conduct research.[6] Exceptions to the general rules or tenets associated with

these research approaches suggest that many of the clashes between researchers' perspectives are more a question of belief systems and mutual lack of understanding than of methods. Nonetheless, the arguments continue to focus on methodological aspects.

Clarifying Differences and Acknowledging Similarities

The dichotomy of quantitative, deductive analysis under standardized, objective conditions versus qualitative, inductive inquiry aimed at understanding phenomena in uncontrolled, natural contexts remains a barrier between researchers from different analytical disciplines,[7] particularly those studying the etiology and consequences of disease.[8] We believe these distinctions are particularly unhelpful when the target of research is the study of chronic problems. Chronic diseases, by their very nature, require the complementary use of qualitative and quantitative research methods in order to quantify the effectiveness of treatments and qualify the illness experience as it progresses over time.[1]

TABLE 1

Usual[a] distinctions between quantitative and qualitative methods

Concepts usually associated with quantitative method	Concepts usually associated with qualitative method
Type of reasoning	
Deduction	Induction
Objectivity	Subjectivity
Causation	Meaning
Type of question	
Pre-specified	Open-ended
Outcome-oriented	Process-oriented
Type of analysis	
Numerical estimation	Narrative description
Statistical inference	Constant comparison

[a] The use of the term "usual" is meant to remind readers that these distinctions are not entirely discrete. In fact, there is a spectrum of research that encompasses both methods that, in turn, crosses these traditional demarcations.

Instead of either ignoring or defending a particular research paradigm, it is possible and more instructive to see qualitative and quantitative methods as part of a continuum of research techniques, all of which are appropriate depending on the research objective. For example, Shaffir and Stebbins have modeled this continuum in a way that challenges the notion that qualitative approaches are solely exploratory and inductive, while quantitative methods are only explanatory and deductive.[9] Guba and Lincoln,[10] offer this comment.

> *Both qualitative and quantitative methods may be used appropriately with any research paradigm. Questions of method are secondary to questions of paradigm, which we define as the basic belief system or world view that guides the investigator.*

Careful review of the full spectrum of both major research paradigms will confirm that both methods can be used in less "usual" ways, i.e. it is possible to quantitatively describe observable events in the real world and to collect qualitative evidence within pre-specified, experimental situations. Alongside recognizing that both methods can be used in these "unusual" ways, it is also important to remember that both methods contain many different approaches. For example, grounded theory and case study are different approaches than those of ethnography or phenomenology, and yet all four approaches are essentially qualitative. The same sort of distinctions apply to quantitative approaches: all clinical trials are not identical in design and therefore use differing techniques for measuring results, and there are many different forms of experimental, quasi-experimental and pre-experimental designs, using equally varied quantitative analyses. The point here is not to understand the specific differences of these techniques, but to highlight the existence of a range of options under both the qualitative and quantitative "umbrellas."[11–13]

There is a need to recognize that both methodological schools have an equally respectable place in health and health care research; quantitative and qualitative techniques can and should co-exist as potential tools of the research trade. Instead of worrying about justifying the less highly regarded method (which appears to shift over time and across disciplines in any case), efforts should focus on understanding why and when to use one or the other method, or both.

The concept of capturing the inter-relatedness, rather than the differences, of qualitative and quantitative methods is beginning to receive greater attention in health research. For example, Daly et al.[14] indicate that effective health care research cannot be reduced to a matter of using a "strong" [usually thought to be quantitative rather than qualitative] method; rather, many important health issues must be tackled using a range of methods.

> *In short, our belief is that the broad range of questions that arise from complex health care problems can only adequately be addressed by an equally broad range of research study designs. Those who undertake evaluation and research in health care must therefore cultivate methodological flexibility.*

Any study design or combination of research methods selected for use should be responsive to the particular research problem or question. For example, exploring the implementation of new health care delivery arrangements requires a mainly qualitative approach, since it is not possible to divorce the processes of change under study from the social contexts in which they occur. On the other hand, a study designed to identify the glucose tolerance of people with diabetes versus people without the disease requires essentially quantitative analysis of differences under carefully controlled conditions. Approaching the question of which method is best in *this* way avoids the debate entirely and, arguably, better conforms to the rules of "good" science.[15]

Collaborating Across Traditional Boundaries

Within the discussion of what constitutes good science, there is a slow but important movement toward more collaborative use of both types of research methods in the field of health research, particularly in relation to the study of chronic diseases. Positive suggestions for combining quantitative and qualitative approaches are emerging from some health-oriented disciplines.

Sociology and nursing are fields that struggle with the divide often separating researchers who prefer one or the other technique; however, some researchers in both fields are promoting greater harmony. For example, sociologists Strauss and Corbin[16] stated: "To systematize and solidify connections we use a combination of inductive and deductive thinking, in which we constantly move between questions, generating hypotheses and making comparisons." Commenting on the schism in nursing research, Corner[17] suggested that "the use of different research methods within a single study can provide a richer and deeper understanding of the area under investigation than would otherwise be possible."

Medical research is also beginning to include qualitative approaches more often. For example, a team of physicians and other researchers[18] used a qualitative inquiry nested within a larger clinical survey in order to better elicit patient expectations for medical care.

Clearly, some developments across a continuum of health care research follow the logic of identifying what kinds of research skills and corresponding methods are responsive to the problems that require addressing within the health care field today. The capacity to better understand and improve the ongoing support for individuals living with chronic diseases surely encompasses a number of such health and health care challenges.

Examples from Chronic Disease Research

Spanning Paradigms and Combining Methods

Combined method research approaches are particularly suited to the study of chronic disease and long-term illness.[1,19–21] It is especially important to recognize the benefits of widening research efforts in relation to chronic diseases. As Holman[1] comments," Conventional biomedical research has not provided decisive information about the origins or management of the most prevalent contemporary medical problems, namely, chronic illnesses." Finding ways to move beyond the limitations of traditional research boundaries can help expand understanding of some of the most long-term and widespread health problems facing populations today. We believe that it is through combined, sustained and complementary use of qualitative and quantitative research methods that advances in our knowledge of chronic diseases can best be attained.

Once the philosophical differences (different world views) and practical barriers (lack of knowledge or expertise) to using a combined approach are recognized, they can be managed constructively, and a number of potential ways to usefully combine qualitative and quantitative techniques will emerge. Various combinations have been described by several health researchers;[22–25] however, use of these potential multi-method options is still relatively new in the context of chronic disease research.

Some examples of how combined study approaches can help us better understand and treat individuals living with chronic diseases make the generic uses outlined in Table 2 more accessible and relevant. Six possible uses of combined method approaches are described below to help promote their use within the context of future chronic disease research.

TABLE 2

Potential combined uses of quantitative and qualitative methods

Reasons for using quantitative and qualitative data
1. To develop measures
2. To identify relevant phenomena
3. To interpret/explain quantitative data
4. To interpret/explain qualitative data
5. To gain equal/parallel value from both types of data
6. To conduct effective multistage (longitudinal) analysis

Use #1: To Develop Measures

The most generally accepted use of combined methods is to begin with a qualitative exploration of some little-studied problem so that measurement instruments can be developed for later quantitative research. For example, Bauman and Adair's study[26] of social support among inner-city mothers of children with chronic illnesses used qualitative interviewing to inform the construction of a questionnaire. An exploratory study of how chronic diabetes affects quality of life and/or treatment choices among cultural groups not yet well researched (in order to

subsequently develop a survey tool) provides another example well-suited to this design type.

Use #2: To Identify Relevant Phenomena

Persons coping with chronic conditions often rely on the effectiveness of medications to relieve or at least minimize painful, debilitating symptoms. Such is the case for individuals with heart disease who control pain from angina with prescribed medication. Quantitative research has identified drugs that are "effective" for this pain control. Such study alone, however, does not always sufficiently describe all of the side effects that may accompany this pain relief, nor can it encompass the meaning for individuals suffering from these side effects. The addition of qualitative study can often more fully identify and explain side effects or problems of compliance with drug regimes experienced by people living with chronic heart disease. Clearly, both kinds of evidence are critical if research is to capture the full experience of long-term chronic heart disease.

Additional examples from the literature include a study by Bashir et al.,[27] looking at the relevance of qualitative advice to chronic benzodiazepine users, and work by Borges and Waitzkin.[28] The latter researchers conducted a review of both quantitative and qualitative patient-doctor communication techniques in order to develop an interpretive method for their study of women with chronic social and emotional problems.

Use #3: To Interpret/Explain Quantitative Data

The quantification of rates of chronic disease can often leave researchers with unanswered questions about why rates are different over time or by geographic region. So, for example, when quantitative evidence points to a seemingly unexplained high prevalence of asthma in Alberta compared to other parts of Canada, qualitative analysis of the reasons for this is warranted. Qualitative techniques will tell the story behind the comparative quantification. Wainwright's study[29] of chronic liver disease employs this approach, describing how qualitative research can lead to additional quantitative and qualitative appraisal of psychological adjustment to end-stage chronic liver disease.

Use #4: To Interpret/Explain Qualitative Data

The exploration of qualitative aspects of living with many chronic conditions can lead to a deep understanding of how certain individuals experience living with their illnesses. Sometimes, these descriptive data on how people live with a particular chronic condition appear inconsistent according to gender or age differences. In the context of a qualitative study, both sample size and method are inadequate to test the validity of any apparent distinctions. Only quantitative study can test these findings with sufficient and appropriate sampling.

In Finkler and Correa's study[30] of patients' perceived recovery and the role of the patient-doctor relationship, statistical analysis revealed that only some components of the relationship significantly influenced treatment outcomes. This prompted review of the qualitative data and further development of a qualitative understanding of the patient-doctor relationship.

Use #5: To Gain Equal/Parallel Value from Both Types of Data

The above reason for combining methods is arguably the most prevalent in today's climate of continuing scepticism about use of both qualitative and quantitative approaches in single studies. Examples could include combining the results of any studies that separately, but simultaneously, research a chronic disease. So, while one group of researchers is quantifying the efficacy of a particular treatment for breast cancer, another group may be comparing women's experiences of surviving following detection and treatment of breast cancer. In this case, however, a combined, co-ordinated study design has not really been accomplished.

Truly combined method approaches would purposely connect the study objectives and methodologies in the context of a single study or within a planned program of research in order to access a more comprehensive range of information and experience. For example, Martin and Nisa's research[31] intentionally combines qualitative and quantitative information to describe common features of common chronic children's illnesses. Rutgaizer and Larina's study[32] of pain syndrome in gastroenterological practice, and Murray and Graham's work[33] on community health needs also use a truly combined method approach.

Use #6: To Conduct Effective Multistage (Longitudinal) Analysis

The very nature of chronic illness invites longitudinal programs of research.[1,34] Long-term illness often entails coping with a number of increasingly disabling stages; arguably, each stage requires understanding in and of itself and in the context of the overall condition. A program of ongoing study, using both qualitative and quantitative research, can provide essential knowledge of the changing nature of the disease and the corresponding experience and needs of persons with the illness.

So, for example, a survey of persons living with HIV/AIDS, aimed at quantifying the difference that new treatments are making in relation to longevity, might be planned in the context of a follow-up study focused on qualitatively assessing changes in quality of life. These study phases could, in turn, be followed by an experimental intervention designed to compare the efficacy of two different treatment regimes, over time and in relation to length and quality of life.

A research program conducted by Bates and Rankin-Hill,[35] combining two qualitative and two quantitative projects among chronic pain sufferers, provides a recent example of this longitudinal approach to combined use of methods. The "spiral" approach used by de Vries et al.[36] in their development of health education program

planning also describes the valuable "interaction" that use of both qualitative and quantitative methods over time can achieve.

Making a Difference through Multi-method Study

There is an intuitive appeal to combining research approaches, but the barriers separating researchers—different world views, different training, simple lack of contact and understanding—all conspire to make collaboration difficult. Perhaps discussion, education and debate of the advantages and potentials for working across research paradigms will find a particularly receptive audience in relation to chronic disease conditions. If research can be improved by linking quantitative and qualitative researchers and using a combined method approach to the study of managing chronic disease, then such collaborations should be encouraged and supported. People living with long-term illnesses surely deserve the best efforts of the research community.

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Book Review

Topics in Environmental Epidemiology

Edited by Kyle Steenland and David A Savitz
New York: Oxford University Press, 1997; 363 pp;
ISBN 0-19-509564-2; $70.95 (CAN)

This book is about environmental epidemiology, which it defines as the epidemiology of the health consequences of exposures that are involuntary and that occur in the general environment, including air, water, diet or soil. It is often difficult to differentiate between environmental epidemiology and occupational epidemiology. As clarified in an example given in the introductory chapter, community exposure to lead from a plant is an issue of environmental epidemiology, whereas worker exposure to lead in the plant is a problem of occupational epidemiology; study design and methods for these two populations would be different.

There are 15 chapters in the book, including the introduction and conclusion, 2 chapters on methodology (design and analysis, and meta-analysis and risk assessment) and 11 chapters on various current issues in environmental epidemiology: diet and food contaminants; chlorinated hydrocarbons and infectious agents in water; particulates, nitrogen dioxide and ozone in air; effects of environmental tobacco smoke; radon; electromagnetic fields; and lead.

As the name of the book suggests, it is on "topics in environmental epidemiology." One would therefore not expect the methodology chapters to be complete and comprehensive. For example, the design and analysis chapter only describes three areas that are uniquely important in environmental epidemiology: ecologic studies, cluster analysis and misclassification of exposure. This chapter, however, presents more problems than solutions, leaving one to wonder about the value of environmental epidemiologic studies. The chapter on meta-analysis and risk assessment, on the other hand, is definitely more positive. It has solid step-by-step examples to guide the readers through the calculations. To understand the mathematics in the two methodology chapters, however, basic knowledge at the introductory epidemiology level is required.

The current issues in environmental epidemiology are well covered in the rest of the book. Comprehensive overviews of each issue, with abundant references, provide readers with good starting points to look into the wealth of literature on these issues. The book also provides a generous supply of summary tables on various previous studies. Examples include food-borne epidemics, chemicals in drinking water, infectious agents in drinking water, infectious agents in recreational water, particulates and mortality, particulates and hospital usage, particulates and respiratory diseases, particulates and lung function, nitrogen dioxide and respiratory diseases, ozone and lung function, passive smoking and respiratory diseases, passive smoking and middle ear diseases, passive smoking and childhood asthma, passive smoking and sudden infant death syndrome, passive smoking and lung cancer, passive smoking and heart disease, radon and lung cancer, and lead and blood pressure.

If one is interested in an overview of environmental epidemiology, the last chapter, "Future Trends in Environmental Epidemiology," written by the editors, is definitely worth reading. It provides an overall synthesis of our identified environmental problems, a summary of what environmental epidemiologists have achieved to date, methodological problems in studies and a look at the future.

Overall rating:	7 out of 10
Strengths:	Good review of up-to-date studies on various environmental health issues Nice summary tables of environmental epidemiologic studies Large amount of references on each topic
Weaknesses:	Could have expanded its methodological section beyond the current two chapters to cover a wider range of methodological issues
Audience:	Epidemiologists who are interested in environmental health problems

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Abstract Reprints

1. The use of outpatient mental health services in the United States and Ontario: the impact of mental morbidity and perceived need for care

Steven J Katz, Ronald C Kessler, Richard G Frank, Philip Leaf, Elizabeth Lin, Mark Edlund
***Am J Public Health** 1997;87(7):1136–43*

Objectives. This study compared the associations of individual mental health disorders, self-rated mental health, disability, and perceived need for care with the use of outpatient mental health services in the United States and the Canadian province of Ontario.

Methods. A cross-sectional study design was employed. Data came from the 1990 US National Comorbidity Survey and the 1990 Mental Health Supplement to the Ontario Health Survey.

Results. The odds of receiving any medical or psychiatric specialty services were as follows: for persons with any affective disorder, 3.1 in the United States vs 11.0 in Ontario; for persons with fair or poor self-rated mental health, 2.7 in the United States vs 5.0 in Ontario; for persons with mental health-related disability, 3.0 in the United States vs 1.5 in Ontario. When perceived need was controlled for, most of the between-country differences in use disappeared.

Conclusions. The higher use of mental health services in the United States than in Ontario is mostly explained by the combination of a higher prevalence of mental morbidity and a higher prevalence of perceived need for care among persons with low mental morbidity in the United States.

2. Insomnia in young men and subsequent depression
The Johns Hopkins Precursors Study

Patricia P Chang, Daniel E Ford, Lucy A Mead, Lisa Cooper-Patrick, Michael J Klag
***Am J Epidemiol** 1997:146(2):105–14*

The Johns Hopkins Precursors Study, a long-term prospective study, was used to study the relation between self-reported sleep disturbances and subsequent clinical depression and psychiatric distress. A total of 1,053 men provided information on sleep habits during medical school at The Johns Hopkins University (classes of 1948–1964) and have been followed since graduation. During a median follow-up period of 34 years (range 1–45), 101 men developed clinical depression (cumulative incidence at 40 years, 12.2%), including 13 suicides. In Cox proportional hazards analysis adjusted for age at graduation, class year, parental history of clinical depression, coffee drinking, and measures of temperament, the relative risk of clinical depression was greater in those who reported insomnia in medical school (relative risk (RR) 2.0, 95% confidence interval (CI) 1.2–3.3) compared with those who did not and greater in those with difficulty sleeping under stress in medical school (RR 1.8, 95% CI 1.2–2.7) compared with those who did not report difficulty. There were weaker associations for those who reported poor quality of sleep (RR 1.6, 95% CI 0.9–2.9) and sleep duration of 7 hours or less (RR 1.5, 95% CI 0.9–2.3) with development of clinical depression. Similar associations were observed between reports of sleep disturbances in medical school and psychiatric distress assessed in 1988 by the General Health Questionnaire. These findings suggest that insomnia in young men is indicative of a greater risk for subsequent clinical depression and psychiatric distress that persists for at least 30 years.

3. Recent trends in infant mortality rates and proportions of low-birth-weight live births in Canada

KS Joseph, Michael S Kramer
***Can Med Assoc J** 1997;157(5):535–41*

Objective: To identify spatial patterns of changes in infant mortality rates and proportions of low-birth-weight live births observed in 1994.

Setting: Canada.

Subjects: Live births and infant deaths in Canada between 1987 and 1994. Data for Newfoundland were unavailable for 1987 through 1990.

Outcome measures: Annual infant mortality rates (crude and after excluding live newborns weighing less than 500 g); proportion of live births by low-birth-weight category (500–2499 g).

Results: Nova Scotia, New Brunswick, Quebec and Manitoba had lower crude and adjusted infant mortality rates in 1994 than in 1993. Newfoundland, Saskatchewan, Alberta and British Columbia had higher rates in 1994 than in 1993. The crude rate in Ontario was lower, and the adjusted rate higher, in 1994 than in 1993. A downward trend in the proportion of low-birth-weight live births was observed in Quebec (χ^2 for trend = 29.2, $p < 0.01$). Conversely, an upward trend was observed in Ontario (c2 for trend = 241.3, $p < 0.01$). However, the increase may have been due to data errors, especially in 1993 and 1994, involving truncation of ounces in 2 digits to 1 digit (e.g., 5 pounds 10 ounces became 5 pounds 1 ounce).

Conclusions: Although the marginal increases in infant mortality observed in several provinces could be the result of random variation, future trends should be closely monitored. The proportion of low-birth-weight live births in Canada (excluding Ontario) appears to be stable, with Quebec showing significant reductions. The errors in data for Ontario need to be corrected before trends can be estimated for that province and for Canada as a whole.

4. Temporal trends in Canadian birth defects birth prevalences, 1979–1993

Kenneth C Johnson, Jocelyn Rouleau
***Can J Public Health** 1997;88(3):169–76*

The Canadian Congenital Anomalies Surveillance System monitors birth defects reported for stillborns, newborns and infants during the first year of life. Data are available through the 1980s and early 1990s for Ontario, Manitoba and Alberta, and since 1984 for an additional four provinces. Fifty-seven routine monitoring categories and 15 summary categories were examined for temporal trends. Comparing the period 1979–1981 with 1991–1993, the reported birth defect case birth prevalence increased by 0.2% and the total birth defects birth prevalences by 2.5%. The birth prevalence of central nervous system defects decreased by 8.2%; the reported birth prevalence increased for congenital heart defects by 41%, urinary defects by 127%, Down syndrome by 13% and other chromosomal defects by 47%. Further investigation of individual defects would be required to evaluate the degree to which changes in reported birth prevalence reflect changes including the availability and use of specific diagnostic procedures. The work highlights the need to expand the surveillance system to include all affected pregnancies where an anomaly has been detected antenatally.

5. Screening for adolescent smoking among primary care physicians in California

Merula Franzgrote, Jonathan M Ellen, Susan G Millstein, Charles E Irwin Jr
***Am J Public Health** 1997;87(8):1341–5*

Objectives. This study determined how often primary care physicians ask adolescents about smoking.

Methods. We surveyed a stratified random sample of community-based, board-certified California physicians, using a mailed questionnaire.

Results. Overall, physicians (n = 343: 77% response rate) screened younger adolescents for regular smoking during 71.4% (95% confidence interval [CI] = 67.9, 74.9) of routine physical exams and older adolescents during 84.8% (95% CI = 82.3, 87.4) of such visits. For acute-care visits, the screening rates were 24.4% (95% CI = 20.6, 28.1) for younger and 40.2% (95% CI = 36.4, 44.0) for older adolescents. Physicians asked 18.2% (95% CI = 15.2, 21.3) of younger and 35.6% (95% CI = 32.0, 39.1) of older adolescents about experimental smoking. Screening varied by specialty.

Conclusions. These data imply that physicians are missing opportunities to screen adolescents for smoking.

6. Effectiveness of a call/recall system in improving compliance with cervical cancer screening: a randomized controlled trial

Sharon K Buehler, Wanda L Parsons
***Can Med Assoc J** 1997;157(5):521–6*

Objective: To determine the effectiveness of a simple call/recall system in improving compliance with cervical cancer screening among women not screened in the previous 3 years.

Design: Prospective randomized controlled study.

Setting: Two family medicine clinics (1 urban, 1 rural) affiliated with Memorial University of Newfoundland, St. John's.

Participants: A sample of women aged 18–69 years who were listed as patients of the clinics but who had not had a Papanicolaou test (Pap test) within the 3 years before the start of the study. Of 9071 women listed as patients 1360 (15.0%) had not undergone screening in the previous 3 years. A random sample of 650 were selected, 209 of whom were excluded because they had had a hysterectomy, had had a recent Pap test, had moved or had records containing clerical errors. This left 441 women for the study.

Intervention: The 221 women in the intervention group were sent a letter asking them to seek a Pap test and a reminder letter 4 weeks later. The 220 in the control group were sent no letters.

Main outcome measures: Number of women who had a Pap test within 2 months and 6 months after the first letter was sent.

Results: Within 2 months, more women in the intervention group than in the control group had been screened (2.8% [5/178] and 1.9% [4/208] respectively). There was also a difference between the overall proportions at 6 months (10.7% (19/178] and 6.3% (13/208] respectively). None of the differences was statistically significant.

Conclusion: A letter of invitation is not sufficient to encourage women who have never or have infrequently undergone a Pap test to come in for cervical cancer screening. The effectiveness of added recruitment methods such as opportunistic screening by physicians, follow-up by telephone and the offer of a specific appointment should be evaluated.

7. Review of the screening history of Alberta women with invasive cervical cancer

Gavin CE Stuart, S Elizabeth McGregor, Maire A Duggan, Jill G Nation
***Can Med Assoc J** 1997;157(5):513–9*

Objective: To conduct a failure analysis of cervical cancer screening among women with invasive cervical cancer in Alberta.

Design: Descriptive study. Review of demographic, staging and treatment information from cancer registry records; generation of documented screening history from Alberta Health billing records and self-reported history from subjects who agreed to be interviewed; and comparison of findings in initial cytology reports with those from subsequent review by at least 2 pathologists of all cytology slides for each patient for the 5 years before diagnosis. Cases were assigned to 1 of 6 categories of identified screening failure.

Setting: Alberta.

Subjects: All women with diagnosis of invasive cervical cancer reported to a population-based provincial cancer registry from January 1990 to December 1991.

Outcome measures: Demographic, staging and treatment information; documented and self-reported screening histories; correlation of test results in initial cytology report with those generated from slide review; category of identified screening failure.

Results: Of the 246 women identified with invasive cancer of the cervix, 37 (15.0%) had stage IA disease; 195 (79.3%) had squamous-cell carcinoma, and 35 (14.2%) had adenocarcinoma. According to the categories of screening failure, 74 women (30.1%) had never been screened, 38 (15.4%) had not been screened within 3 years before diagnosis, 42 (17.1%) had had a false-negative cytology result, and 20 (8.1%) had been managed outside of conventional protocols. Of the 23 women (9.3%) who had been screened appropriately and had true-negative results, 19 had smears that were considered technically limited. It was not possible to classify 49 (19.9%) of the cases. Agreement between the documented and the self-reported screening histories was exact for only 39 (36.1%) of the 108 women interviewed.

Conclusions: Despite widespread use of opportunistic cervical screening, many women in Alberta are still not being screened adequately. In most cases women are being screened too infrequently or not at all. Self-reported screening histories are unreliable because many women may overestimate the number of smears. An organized approach to screening, as recommended by the National Workshop on Cervical Cancer Screening, may assist in reducing the incidence of invasive cervical cancer.

8. Surgical procedures associated with risk of ovarian cancer

Nancy Kreiger, Margaret Sloan, Michelle Cotterchio, Phil Parsons
***Int J Epidemiol** 1997;26(4):710–5*

Background. This historical cohort study was conducted to examine the relationship between gynaecological surgery and ovarian cancer risk.

Methods. Women were included if they had had tubal ligation, hysterectomy, or unilateral ovariectomy in Ontario between March 1979 and April 1993. The cohort was linked to the Ontario Cancer Registry and the Ontario mortality file. Person-years in the cohort were accumulated until death, the removal of both ovaries, a diagnosis of ovarian cancer, or the end of the study period 31 December 1993. Observed cancers were compared to expected based on Ontario age- and calendar period-specific incidence rates.

Results. For tubal ligation and hysterectomy, fewer ovarian cancers were observed than were expected by age, calendar year of procedure, and length of follow-up; the observed/expected ratios were generally statistically significant. In contrast, no protective effect was evident for unilateral ovariectomy; in fact statistically significant excess cancers were seen in early follow-up periods. Observed/expected ratios were nearly identical and somewhat protective for the two strata defined by whether or not the ovaries were visualized. Disruption of the ovarian pathway conferred a protective effect, while no disruption significantly increased risk.

Conclusions. The data do not support screening bias although short-term follow-up data indicate the possibility of detection bias. The long-term follow-up data, as well as the data on pathway disruption, are consistent with the hypothesis that the surgical procedures themselves may produce a protective effect against ovarian cancer, through alteration of the hormonal environment and/or by physical destruction of a carcinogen's route to the ovary.

9. Effects of cigarette smoking, caffeine consumption, and alcohol intake on fecundability

Kathryn M Curtis, David A Savitz, Tye E Arbuckle
***Am J Epidemiol** 1997;146(1):32–41*

Data from the Ontario Farm Family Health Study were analyzed to determine whether smoking, caffeine, or alcohol use among men and women affect fecundability (the monthly probability of conception). In this retrospective cohort study of farm couples in Ontario, Canada, the farm operator, husband, and wife completed questionnaires during 1991–1992, yielding information on 2,607 planned pregnancies that had occurred over the previous 30 years. Fecundability ratios were calculated using an analog of the Cox proportional hazards model. Cigarette smoking among women and men was associated with decreased fecundability (fecundability ratio = 0.90, 95% confidence interval (CI) 0.82–0.98 and fecundability ratio = 0.88, 95% CI 0.81–0.95, respectively). Caffeine consumption of 100 mg or less versus more than 100 mg in women and men was not associated with fecundability (fecundability ratio = 0.98, 95% CI 0.91–1.07 and fecundability ratio = 1.05, 95% CI 0.97–1.14, respectively). Decreases were observed among women who were coffee drinkers (fecundability ratio = 0.92, 95% CI 0.84–1.00) and men who were heavy tea drinkers (fecundability ratio = 0.85, 95% CI 0.69–1.05), regardless of caffeine content. Alcohol use among women and men was not associated with fecundability. These data are consistent with previous studies of the adverse effect of tobacco on fecundability in female smokers and suggest an effect of smoking among males. Continued evaluation of coffee and tea is warranted to address constituents other than caffeine.

10. Sudden infant death syndrome and smoking in the United States and Sweden

Marian F MacDorman, Sven Cnattingius, Howard J Hoffman, Michael S Kramer, Bengt Haglund
***Am J Epidemiol** 1997;146(3):249–57*

The association between sudden infant death syndrome (SIDS) and maternal smoking was compared between the United States and Sweden—two countries with different health care and social support programs and degrees of sociocultural heterogeneity. For 1991–1991 among the five US race/ethnic groups studied, SIDS rates ranged from a high of 3.0 infant deaths per 1,000 live births for American Indians to a low of 0.8 for Hispanics and Asian and Pacific Islanders. The SIDS rate for Sweden (using 1983–1992 data) was 0.9. The strong association between maternal smoking and SIDS persisted after controlling for maternal age and live birth order. Adjusted odds ratios ranged from 1.6 to 2.5 for mothers who smoked 1–9 cigarettes per day during pregnancy (compared with nonsmokers) and from 2.3 to 3.8 for mothers who smoked 10 or more cigarettes per day during pregnancy. Although birth weight had a strong independent effect on SIDS, the addition of birth weight to the models lowered the odds ratios for maternal smoking only slightly, suggesting that the effect of smoking on SIDS is not mediated through birth weight. SIDS rates increased with the amount smoked for all US race/ethnic groups and for Sweden. Smoking is one of the most important preventable risk factors for SIDS, and smoking prevention/intervention programs have the potential to substantially lower SIDS rates in the United States and Sweden and presumably elsewhere as well.

11. An international comparison of cancer survival: Toronto, Ontario, and Detroit, Michigan, metropolitan areas

Kevin M Gorey, Eric J Holowaty, Gordon Fehringer, Ethan Laukkanen, Agnes Moskowitz, David J Webster, Nancy L Richter
***Am J Public Health** 1997;87(7):1156–63*

Objectives. This study examined whether socioeconomic status has a differential effect on the survival of adults diagnosed with cancer in Canada and the United States.

Methods. The Ontario Cancer Registry and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program provided a total of 58 202 and 76 055 population-based primary malignant cancer cases for Toronto, Ontario, and Detroit, Mich, respectively. Socioeconomic data for each person's residence at time of diagnosis were taken from population censuses.

Results. In the US cohort, there was a significant association between socioeconomic status and survival for 12 of the 15 most common cancer sites; in the Canadian cohort, there was no such association for 12 of the 15 sites. Among residents of low-income areas, persons in Toronto experienced a survival advantage for 13 of 15 cancer sites at 1- and 5-year follow-up. No such between-country differentials were observed in the middle- or high-income groups.

Conclusions. The consistent pattern of a survival advantage in Canada observed across various cancer sites and follow-up periods suggests that Canada's more equitable access to preventive and therapeutic health care services is responsible for the difference.

12. Survival rates for four forms of cancer in the United States and Ontario

Donald M Keller, Eric A Peterson, George Silberman
***Am J Public Health** 1997;87(7):1164–7*

Objectives. In this study, cancer survival rates for patients diagnosed in Ontario and selected areas within the United States were compared.

Methods. Relative survival rates were computed for patients aged 15 through 84 years diagnosed with any of four forms of cancer (breast, colon, lung, and Hodgkin's disease). The cohorts represented those diagnosed over the years 1978 through 1986 in the Canadian province of Ontario and in nine regions covered by the US National Cancer Institute's Surveillance Epidemiology and End Results program. Patients were followed through the end of 1990.

Results. The cumulative relative survival rates were similar for American and Canadian patients. The largest difference was observed for breast cancer, where patients in the United States enjoyed a survival advantage throughout the follow-up period.

Conclusions. Patients in the United States and Ontario with the diseases studied, except for breast cancer, experience very similar survival. The greater use of mammographic screening in the United States could account for that country's higher breast cancer survival rate by promoting earlier and therefore more efficacious treatment, by introducing bias, or by a combination of both treatment and bias factors.

13. Cohort mortality study of pulp and paper mill workers in British Columbia, Canada

Pierre R Band, Nhu D Le, Raymond Fang, William J Threlfall, George Astrakianakis, Judith TL Anderson, Anya Keefe, Daniel Krewski
***Am J Epidemiol** 1997;146:(2)186–94*

The authors studied a cohort of 30,157 male pulp and paper workers in British Columbia, Canada. Of these, 20,373 worked in kraft mills only, 5,249 in sulfite mills only, and 4,535 in both kraft and sulfite mills. All workers with at least 1 year of employment on January 1, 1950, or thereafter until December 31, 1992, were studied. Standardized mortality ratios (SMRs) were used to compare the mortality rates of the cohort with those of the Canadian male population. Ninety percent confidence intervals (CIs) for the SMRs were obtained. Cancer risks significantly associated with work duration and time from first employment of 15 years or more were observed: 1) total cohort: pleura (SMR = 3.61, 90% CI 1.42–7.58); kidney (SMR = 1.69, 90% CI 1.13–2.43); brain (SMR = 1.51, 90% CI 1.03–2.16); 2) workers in kraft mills only: kidney (SMR = 1.92, 90% CI 1.04–3.26); 3) workers in sulfite mills only: Hodgkin's disease (SMR = 4.79, 90% CI 1.29–12.37); 4) workers ever employed in both kraft and sulfite mills: esophagus (SMR = 1.91, 90% CI 1.00–3.33). These malignancies have been associated with the following known or suspected carcinogens to which pulp and paper workers may have been exposed: asbestos (pleura), biocides (kidney), formaldehyde (kidney, brain, Hodgkin's disease), hypochlorite (esophagus). A nested case-control study with detailed exposure assessment is under way to help determine whether excess risks for specific cancers reflect exposure among subsets of workers.

14. Mesothelioma surveillance to locate sources of exposure to asbestos

Kay Teschke, Michael S Morgan, Harvey Checkoway, Gary Franklin, John J Spinelli, Gerald van Belle, Noel S Weiss
***Can J Public Health** 1997;88(3):163–8*

To determine whether there were previously unrecognized sources of asbestos exposure in British Columbia, incident mesothelioma cases (n = 51) and population-based controls (n = 154) were interviewed about their occupational histories and asbestos exposures. The following occupations were at elevated risk: sheet metal workers (OR = 9.6, 95% CI: 1.5–106), plumbers and pipefitters (OR = 8.3, 95% CI: 1.5–86), shipbuilding workers (OR = 5.0, 95% CI: 1.2–23), painters (OR = 4.5, 95% CI: 1.0–24), welders (OR = 3.9, 95% CI: 0.8–22), gardeners (OR = 3.9, 95% CI: 0.8–22), bricklayers (OR = 3.5, 95% CI: 0.9–14), miners (OR = 3.4, 95% CI 0.9–13), machinists (OR = 3.2, 95% CI: 1.0–11), construction foremen (OR = 3.1, 95% CI: 0.9–11), and electricians (OR = 3.0, 95% CI: 0.8–12). In a reanalysis excluding subjects who worked in occupations or processes considered strongly *a priori* at risk, three groups remained of interest: non-asbestos miners (OR = 9.6, 95% CI: 1.8–53), bricklayers (OR = 5.4, 95% CI: 1.0–28), and construction labourers (OR = 2.8, 95% CI 0.7–10.6).

Calendar of Events

November 13–15, 1997 **Vancouver,** **British Columbia**	"Asthma Education: Making it Happen!" 3rd National Conference on Asthma and Education Presented by the Canadian Network for Asthma Care	*Information* A Les McDonald, Executive Director Canadian Network for Asthma Care 1607 – 6 Forest Laneway North York, Ontario M2N 5X9 Tel: (416) 224-9221 Fax: (416) 224-9220 E-mail: cnac@hookup.net Web site: http://www.hookup.net/~cnac
November 19–21, 1997 **Washington, DC (USA)**	"Safe America: Fourth National Injury Control Conference" National Center for Injury Prevention and Control, Centers for Disease Control and Prevention	*Information* Elaine Murray Prospect Associates Tel: (301) 468-6555, ext 2352
November 24–26, 1997 **Kingston, Ontario**	"Communication that Clicks: Strategies and Linkages for Health" 48th Annual Ontario Public Health Association Conference Hosted by the Kingston, Frontenac and Lennox & Addington (KFL&A) Health Unit	*Information* Peter Moccio Tel: (613) 549-1232 *or* Ontario Public Health Association Tel: (416) 367-3313
November 27–29, 1997 **Sherbrooke, Quebec**	Conference: Scientific and Clinical Exchanges on Aging Theme: "Cognitive Aging: Normal and Pathological"	*Information* Krystyna B Kouri, Director Institut universitaire de gériatrie de Sherbrooke Expertise Centre in Gerontology and Geriatrics 375, rue Argyll Sherbrooke (Québec) J1J 3H5 Tel: (819) 569-3661, ext 331 Fax: (819) 565-1443 E-mail: KKouri@courrier.usherb.ca
December 3–5, 1997 **Washington, DC (USA)**	"Prevention Opportunities in the 21st Century" 12th National Conference on Chronic Disease Prevention and Control Sponsors: Centers for Disease Control and Prevention and the Association of State and Territorial Chronic Disease Program Directors	*Information* Professional and Scientific Associates 990 – 2635 Century Parkway Atlanta, Georgia USA 30345 Tel: (404) 633-6869 Fax: (404) 633-6477 E-mail: psaatl@aol.com
February 6–7, 1998 **Toronto, Ontario**	"Better Breathing ’98" Annual Scientific Conference on Respiratory Health of The Ontario Thoracic Society	*Information* The Ontario Thoracic Society 201 – 573 King Street East Toronto, Ontario M5A 4L3 Tel: (416) 864-9911 Fax: (416) 864-9916 E-mail: sbussmann@titan.tcn.net Web site: http://www.on.lung.ca

February 19–21, 1998 **Vancouver,** **British Columbia**	4th International Multidisciplinary Qualitative Health Research Conference	*Information* Dr Joan L Bottorff School of Nursing T201 - 2211 Wesbrook Mall University of British Columbia Vancouver, BC V6T 2B5 Fax: (604) 822-7466 E-mail: qhrconf98@nursing.ubc.ca
February 26–28, 1998 **Orlando, Florida** **USA**	15th Annual International Breast Cancer Conference	*Information* Lois Osman Program Co-ordinator Miami Cancer Conference, Inc. Tel/Fax: (305) 447-3804
April 2–5, 1998 **San Francisco, California** **USA**	"Prevention 98: Translating Science into Action"	*Information* American College of Preventive Medicine 1660 L Street NW, Suite 306 Washington, DC USA 20036-5603 Tel: (202) 466-2044 Fax: (202) 466-2662 E-mail: prevention@acpm.org Web site: www.acpm.org
April 21–23, 1998 **Vancouver,** **British Columbia**	"The Role of Cancer Registries in Cancer Surveillance and Control" Annual Meeting of the North American Association of Central Cancer Registries Hosted by the British Columbia Cancer Registry	*Information* Venue West Conference Services Ltd 645 – 375 Water Street Vancouver, BC V6B 5C6 Tel: (604) 681-5226 Fax: (604) 681-2503
April 22–24, 1998 **Graz, Austria**	6th International Symposium: Epidemiology and Occupational Risks Organized by the International Research Section of the International Social Security Association (ISSA)	*Information* Symposium Secretariat Allgemeine Unfallversicherungsanstalt Kongressbüro Adalbert-Stifter-Strasse 65 A-1200 Vienna, Austria Tel: +43-1-33 111 537 Fax: +43-1-33 111 469 E-mail: presse@auva.or.at
April 26–29, 1998 **Lucerne, Switzerland**	UICC Breast Cancer Meeting International Meeting on the Psycho-social Impacts of Breast Cancer	*Information* Jeanne Froidevaux Swiss Cancer League Effingerstrasse 40, CH-3001 Berne, Switzerland Tel: +41 31 389 91 14 Fax: +41 31 389 91 60 E-mail: froidevaux@swisscancer.ch Web site: http://www.swisscancer.ch

April 27–30, 1998 **Tampa, Florida** **USA**	1998 CDC – Diabetes Translation Conference Centers for Disease Control and Prevention	*Information* Margaret R Hurd Centers for Disease Control, NCCDPHP, DDT 4770 Buford Hwy NE, Mailstop K-10 Atlanta, Georgia USA 30341-3724 Tel: (770) 488-5505 Fax: (770) 488-5966 E-mail: mrh0@cdc.gov
June 7–10 1998 **Montreal, Quebec**	"Best Practices in Public Health: An Essential Contribution, A Promising and Exciting Future" Canadian Public Health Association 89th Annual Conference Co-sponsored by the *Association pour la santé publique du Québec*	*Information* CPHA Conference Department 400—1565 Carling Avenue Ottawa, Ontario K1Z 8R1 Tel: (613) 725-3769 Fax: (613) 725-9826 E-mail: conferences@cpha.ca