

Hepatitis A, B, and C in Canada

Results from the National Sentinel Health Unit Surveillance System, 1993-1995

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ABSTRACT

Objectives: To estimate the incidence of and to describe the risk factors that were associated with the acquisition of hepatitis A, B, and C in well-defined Canadian populations from the Sentinel Health Unit Surveillance System (SHUSS).

Methods: We used the 1993 to 1995 data on hepatitis A, B, and C infection in Canada, collected by SHUSS, a national surveillance system established by the Laboratory Centre for Disease Control in Health Canada in 1993, through consultation and collaboration with provincial partners. We calculated the rates of, and described and discussed the risk factors that were associated with, hepatitis A, B, and C infection, based on the SHUSS surveillance data.

Results: From 1993 to 1995, SHUSS reported 92 cases of hepatitis A, 89 hepatitis B, and 720 hepatitis C, yielding a rate of 3.9, 3.8, and 30.3 per 100,000, respectively. The reported rates varied substantially among participating health units, ranging from 0.8 to 8.1 per 100,000 for hepatitis A, 0.0 to 9.0 for hepatitis B, and 5.4 to 73.3 for hepatitis C. The most frequently reported risk factor for hepatitis A was a history of street drug use, followed by recent international travel and household contact with a hepatitis A case, household crowding, and a history of raw or undercooked shellfish consumption. The most frequently reported risk factors for the acquisition of hepatitis B included history of street drug use and occupational exposure. The most frequently reported risk factor for the acquisition of hepatitis C was a history of street drug use, followed by health care exposure and occupational exposure. Only 5% of persons with hepatitis B infection had a history of hepatitis B immunization.

Interpretation: Despite the limitations of possible bias due to selective participation of SHUSS and the lack of information on risk factors among controls, the high exposure to known risk factors and the low rate of vaccination among hepatitis patients can provide useful information for the development of public health policies to control hepatitis A, B, and C infection in Canada.

La traduction du résumé se trouve à la fin de l'article.

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Hepatitis A continues to be a source of disease burden in both developed and developing countries.^{1,2} The rate of reported hepatitis A in Canada has increased from 4.3 per 100,000 in 1987 to 6.3 in 1997.³ In Canada, persons at risk for hepatitis A infection include travellers to countries with high disease endemic, injection drug users, and men who have sex with men.⁴

Hepatitis B virus infection causes a number of clinical syndromes including subclinical disease, acute self-limited hepatitis and chronic infection associated with long-term sequella such as cirrhosis and hepatocellular carcinoma.⁴⁻⁶ Over the last decade, the rate of new hepatitis B virus infection in Canada has reached a plateau, with approximately 2,000 to 3,000 cases reported annually.⁷ Hepatitis B is a notifiable disease and has been reportable in Canada since 1969. Few studies, however, have been conducted on the prevalence of hepatitis B virus infection in Canada nationally. The most recognized mode of hepatitis B transmission is via unprotected heterosexual and homosexual contact with an infected person, followed by injection drug use and occupational exposure to blood.^{4,8} Vaccine to prevent Hepatitis B infection has been available in Canada since 1982. Current control measures in Canada include a universal, school-based hepatitis B immunization program which has been implemented in all provinces and territories except Manitoba.

The development of serological tests for hepatitis C infection have shown that this virus is the primary etiologic agent of parenterally transmitted non-A, non-B hepatitis and is an important cause of acute and chronic hepatitis worldwide.⁹⁻¹¹ Approximately 90% of infected persons are at risk for chronic liver disease or other hepatitis C virus-related chronic diseases during the first two decades following initial infection.¹² In Canada, risk factors for acquisition include injection drug use, receipt of blood and blood products before 1990, sexual contact with a carrier, percutaneous exposure from needlestick injury, organ transplantation, and unsterile tattooing.¹¹

Reducing the burden of hepatitis A, B, and C infection requires the identification of risk factors and the implementation of appropriate primary prevention programs.

Risk factor information is poorly recorded at both the provincial and national levels in Canada. We thus examined three years of Sentinel Health Unit Surveillance System (SHUSS) data to examine the demographics and the distribution of known risk factors associated with the acquisition of hepatitis A, B, and C in well-defined Canadian populations.

METHODS

To monitor the occurrence of hepatitis A, B and C and to obtain specific information on risk factors, Health Canada's Laboratory Centre for Disease Control developed a national network of surveillance systems in 1993, the SHUSS, which consisted of nine health units located in eight provinces. The nine health units had an aggregate 1996 population of 2,853,985, comprising 9.9% of the population of Canada. Four sites were urban centres (with populations ranging from 193,670 - 663,195) whereas the five remaining sites encompassed both urban and rural communities (with populations ranging from 134,545 - 278,500). The SHUSS was funded and coordinated by Health Canada, and was mandated to conduct targeted research and surveillance to address selected public health issues. The network was operational from 1993 to 1998.

Although provincial partners participated on a voluntary basis, every effort was made to ensure representativeness. Since hepatitis A, B, and C are notifiable diseases in all provinces, ascertainment of clinical cases has been complete. Because we did not initiate universal screening for these infections by laboratory tests in the SHUSS, it is possible that there was incomplete ascertainment of asymptomatic cases. Physicians and laboratories were required to report cases to their local health units, and health units were authorized to contact cases when further information was needed.

Local and private hospital laboratories within the participating health unit were telephoned on a weekly basis to verify that all new laboratory-confirmed cases of hepatitis A, B, and C had been reported to the health unit. Serum samples obtained from all cases were sent to the Viral Hepatitis Section, National Laboratory for

Special Pathogens, Bureau of Microbiology, LCDC, for culture and polymerase chain reaction (PCR) testing.

Diagnosis for hepatitis A, B, and C was based on the Canadian Communicable Disease Surveillance System Disease-Specific Case Definitions and Surveillance Methods.¹³ A confirmed case of hepatitis A was defined as a person with serological confirmation for hepatitis A (positive for IgM antibody to HAV). A probable case of hepatitis A was defined as a person who lives in a household with a known case who has an illness lasting at least two days, characterized by anorexia, vomit, and abdominal discomfort. A clinical case of hepatitis A was defined as a person who lives in the community and has an epidemiological link to a confirmed case; clinical cases must have had an illness lasting two days, characterized by anorexia, vomit and abdominal discomfort. All patients who have previously been identified as having chronic hepatitis B or have previously been diagnosed as having hepatitis C were excluded from the study. Other reasons for exclusion from the study, including the loss of laboratory isolate, were recorded on the SHUSS case drop-out form. A confirmed case of acute hepatitis B was defined as a person who is HBsAg positive and is not known to be a hepatitis B carrier *or* a person who is IgM anti-HAV negative and IgM anti-HBc positive (an indicator of acute HBV infection). A clinical case of hepatitis B was defined as a person who lives in the community and has an epidemiological link to a confirmed case. Chronic hepatitis B was defined as having HBsAg present for at least six months. All patients who did not have hepatitis A, B or C markers present but who had evidence of cytomegalovirus (CMV) or Epstein Barr virus (EBV) infection were also excluded from the study. A confirmed case of hepatitis C was defined as a person who is documented to have seroconverted to hepatitis C. A clinical case of hepatitis C was defined as a person who has an acute episode of hepatitis and is anti-HCV positive and who does not have evidence of acute hepatitis caused by hepatitis A, hepatitis B or Epstein-Barr virus and Cytomegalovirus.

To calculate rates of disease for each participating health unit, census data were obtained for 1993 population denomina-

tors from each health unit. Hepatitis A, B, and C incidences were calculated as the number of cases per health unit per 100,000 persons.

Interviews of hepatitis A, B, and C cases were conducted using a standardized SHUSS questionnaire form. The same questionnaire was used for all cases with hepatitis, regardless of type. Only completed questionnaires were used in the study. Proxy interviews were conducted for deceased patients upon obtaining appropriate consent. During the interview, general demographics and possible risk factors associated with acquiring hepatitis A, B, and C were collected. Symptomatic transmission of viral hepatitis within a household was also determined as part of the risk factor assessment. Persons identified as symptomatic but who were non-household members were asked to participate in the study if they were also found to have hepatitis. No interviews for risk factors have been conducted for controls or samples of the general population in the participating health units. Percentages of patients who reported having been exposed to risk factors of acquiring hepatitis infection were tabulated. Because one patient may have exposure to multiple risk factors, because of the difficulty in setting up a ranking system to assign one individual risk factor to one patient only, and because no parallel data on risk factors were collected for controls, no statistical analysis was performed for the distribution of risk factors.

RESULTS

During the 3 years of study, 92 cases of hepatitis A, 89 cases of hepatitis B, and 720 cases of hepatitis C were registered by the SHUSS, with a rate of 3.9, 3.8, and 36.0 per 100,000, respectively, for hepatitis A, B, and C.

Rates of reported hepatitis varied substantially among the participating sentinel health units: 0.8 to 8.1 per 100,000 for hepatitis A, 0.0 to 9.0 per 100,000 for hepatitis B, and 5.4 to 73.3 per 100,000 for hepatitis C.

The age distribution of hepatitis A cases in SHUSS was similar to that of the National Notifiable Disease Registry System (NNDRS), with 30% of cases under 15 years of age. On the other hand, the male to female ratio of hepatitis A in

TABLE I**Percentage of Patients Who Reported Having Been Exposed to Potential Risk Factors of Acquiring Hepatitis A (n=92) in Canada, 1993-1995**

Potential Risk Factors	% Patients Who Reported Exposure
Any street drug	35
Injected drug	8
> 5 persons per household	25
> 1 person under 5 years	16
Household contact with hepatitis A case	27
Raw/undercooked shellfish consumption	17
Out of country travel in last 2 weeks to 6 months prior to illness	27
Bisexual male	2
Sexual partner who had hepatitis A in last 6 weeks to 6 months prior to illness	7

TABLE II**Percentage of Patients Who Reported Having Been Exposed to Potential Risk Factors of Acquiring Hepatitis B (n = 89) in Canada, 1993-1995**

Potential Risk Factors	% Patients Who Reported Exposure
Any street drug	76
Injected drug, no needle sharing	17
Injected drug, needle sharing/no cleaning	18
Injected drug, needle sharing/cleaning	4
Male homosexual	5
Male bisexual	1
Sex partner \geq 2	32
Sex partner who used street drug	35
Sex partner who had hepatitis B	27
Dental or other oral surgery in last year prior to illness	40
Surgery in last year prior to illness	7
Ever had blood transfusion	15
Hospitalization in last year prior to illness	17
Health care worker	8
Ever had hepatitis B immunization	5

TABLE III**Percentage of Patients Who Reported Having Been Exposed to Potential Risk Factors of Acquiring Hepatitis C (n = 720) in Canada, 1993-1995**

Potential Risk Factors	% Patients Who Reported Exposure
Any street drug	83
Injected drug, no needle sharing	16
Injected drug, needle sharing/no cleaning	44
Injected drug, needle sharing/cleaning	10
Homosexual	1
Bisexual	7
Sex partner \geq 2	18
Sex partner who used injected drug	33
Sex partner who had hepatitis C	11
Dental or other oral surgery in last year prior to illness	41
Surgery in last year prior to illness	12
Hospitalization in last year prior to illness	17
Ever had blood transfusion	30
Blood transfusion before 1970	2
Blood transfusion 1970-1979	5
Blood transfusion 1980-1989	13
Blood transfusion 1990-1995	10
Health care worker	18

SHUSS data was 0.8; quite different from a male-to-female ratio of 1.5 in the NNDRS data. The most frequently reported risk factor for hepatitis A infection was a history of street drug use (35%), followed by recent international travel, household contact with a hepatitis A case, household crowding, and a history of raw or undercooked shellfish consumption (Table I).

The age distribution of hepatitis B cases in SHUSS data was similar to that of the NNDRS, with the highest number of hepatitis B cases in the 20-39 age range.

The most frequently reported risk factor for hepatitis B infection was street drug use, followed by dental or other oral surgery in the last year prior to illness, sexual contact with a partner with prior street drug use, multiple sex partners, contact with a sex partner who had hepatitis B, and injection drug use with needle sharing and no cleaning of equipment (Table II). Only 5% of patients had ever had hepatitis B immunizations.

Seventy percent of hepatitis C cases in the SHUSS data were between 25 and 39

years of age, compared to the 16% of cases from this age group reported in NNDRS. The male-to-female ratio of hepatitis B was 0.9 in the SHUSS data, compared to 1.9 in NNDRS. The most frequently reported risk factor for hepatitis C infection was street drug use, followed by injection drug use with needle sharing and no cleaning of equipment, dental or other oral surgery in the last year prior to illness, contact with a sex partner who had hepatitis C, and ever having had a blood transfusion (Table III).

DISCUSSION

Several limitations of the SHUSS data should be emphasized before interpreting the results. First, the completeness of ascertainment of asymptomatic cases may vary among participating health units. For unmeasured reasons, residents covered by different health units may have different motivations for seeking, or different access to, laboratory testings for hepatitis. The variation in completeness of ascertainment may vary according to the type of hepatitis. Second, risk factor information was only collected from cases. We can thus only calculate the proportion of cases with risk factors rather than the true risk of hepatitis. As mentioned, health unit participation in SHUSS was voluntary. If the distribution of demographics and risk factors in the participating health units is different from the general population, the relative importance of risk factors estimated from sentinel health units may be not generalized into the population at large. Finally, for various reasons, some hepatitis patients (about 5%) failed to be contacted. If the characteristics of non-responding cases were different from those contacted, the estimated distribution of risk factors may be distorted.

The data collected through SHUSS was the only available option to assess the relative importance of known risk factors for the acquisition of hepatitis in Canada. Despite various limitations, information obtained from this data source can be useful for the development of public health measures to control hepatitis A, B, and C infection in Canada. For example, the high exposure to known risk factors and the low rate of vaccination among hepatitis patients suggest that the majority of these infections can be prevented by simple mea-

asures such as avoiding a high-risk lifestyle and increasing the public awareness of the importance of vaccination. Such information can also help to identify the groups of persons at increased risk of acquiring hepatitis who would be most likely to benefit from vaccination for hepatitis or other disease prevention programs, and to locate regions with high burdens of hepatitis so that adequate resources can be allocated to these regions to deal with the situation.

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RÉSUMÉ

Objectifs : Évaluer l'incidence des facteurs de risques associés à l'acquisition de l'hépatite A, B ou C dans des populations bien définies du Canada et les décrire au moyen des renseignements du Système de surveillance par unité de santé sentinelle (SSUSS).

Méthodes : Nous avons utilisé les données sur les infections aux hépatites A, B et C recueillies de 1993 à 1995 par le SSUSS, un système de surveillance national créé par le Laboratoire de lutte contre la maladie de Santé Canada en 1993, lors de consultations et de collaboration avec des partenaires provinciaux. En se fondant sur les données de surveillance du SSUSS, nous avons calculé les taux d'infection, décrit les facteurs de risques associés à l'infection aux hépatites A, B et C, et discuté de ces facteurs.

Résultats : De 1993 à 1995, le SSUSS a enregistré 92 cas d'hépatite A, 89 cas d'hépatite B et 720 cas d'hépatite C, ce qui représente des taux de 3,9, de 3,8 et de 30,3 pour 100 000 respectivement. Les taux varient considérablement parmi les unités sanitaires participantes, allant de 0,8 à 8,1 pour 100 000 pour l'hépatite A, de 0,0 à 9,0 pour 100 000 pour l'hépatite B et de 5,4 à 73,3 pour 100 000 pour l'hépatite C. En ce qui concerne l'hépatite A, la consommation de drogues illicites est le facteur de risque le plus souvent rencontré, suivi par les voyages récents à l'étranger, les contacts familiaux avec une personne atteinte, le surpeuplement du logement et la consommation de mollusques et de crustacés crus ou pas assez cuits. Pour ce qui est de l'hépatite B, les facteurs de risques les plus fréquemment signalés sont la consommation de drogues illicites et l'exposition professionnelle. Quant à l'hépatite C, le facteur le plus souvent constaté est la consommation de drogues illicites, suivi par l'exposition à l'occasion de soins de santé et l'exposition professionnelle. Seulement 5 % des personnes infectées par l'hépatite B avaient reçu un vaccin contre cette maladie.

Interprétation : Malgré les limites de l'impartialité possible découlant de la participation sélective employée par le SSUSS et du manque d'information sur les facteurs de risques dans les mécanismes de contrôle, l'exposition élevée aux facteurs de risques connus et le faible taux de vaccination parmi les patients atteints d'une hépatite peuvent fournir des renseignements utiles pour l'élaboration de politiques sur la santé publique pour contrôler les infections aux hépatites A, B et C au Canada.

Erratum

À cause d'une erreur d'impression, le graphique qui suit était incomplète dans le numéro septembre-octobre 2002 de la *Revue canadienne de santé publique*, Volume 93, No 5, page 350. La graphique est réimprimée ici en entier.

La *RCSPP* présente ses excuses aux auteurs ainsi qu'aux lecteurs de la Revue.

Due to a printing error, the following figure was incomplete in the September/October 2002 issue of the *Canadian Journal of Public Health*, Volume 93, No.5, page 350. It is reprinted here in its entirety.

The *CJPH* extends apologies both to the authors and to *CJPH* readers.

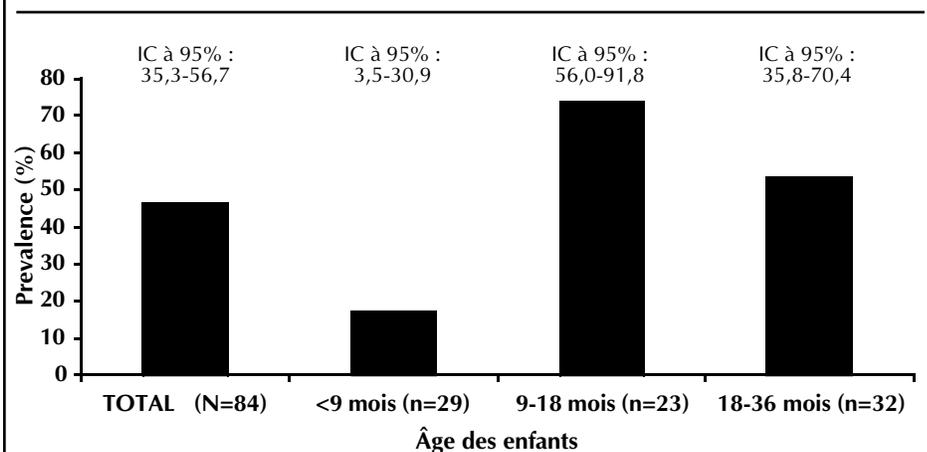


Figure 1. Prévalence globale des problèmes de la communication présentés par des enfants négligés selon l'âge