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Hepatitis C Prevention: An Examination of Current International Evidence

Executive Summary

Prepared for:
Hepatitis C Prevention, Support and Research Program
Hepatitis C Division
Population and Public Health Branch

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Introduction

"Incomplete scientific evidence does not confer upon us the freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand."

From an address by Sir Austin Bradford Hill to the Royal Society of Medicine, 1965.

This report examines the available evidence regarding the prevention of the spread of the hepatitis C virus (HCV)[a]. First, it examines prevention strategies and lessons learned from an evidence-based perspective in developed countries that would be useful to the Canadian context. Second, the paper considers what Canada could undertake strategically from the international experience in the short and long term. The latter includes a review of key papers and identification of key issues, gaps and opportunities, and strategic directions for inclusion in an eventual action plan on hepatitis C prevention.

Hepatitis C Prevention, Support and Research Program

On September 18, 1998, the federal Minister of Health announced his strategy to address the concerns of Canadians regarding hepatitis C. The objectives of this strategy were twofold: (a) to improve blood safety and build knowledge about hepatitis C; and (b) to ensure that Canadians who have been infected by hepatitis C through the blood system do not incur out-of-pocket expenses for medical treatment.

The Hepatitis C Division in Health Canada was created to ensure that the federal capacity was in place to respond to the challenges and needs posed by hepatitis C. This Division has a mandate: to act as a focal point for a population health approach to hepatitis C; to build knowledge and provide evidence by fostering research initiatives; to increase awareness and capacity; to develop prevention strategies and support initiatives; and to ensure that Canadians who have been infected through blood do not incur out-of-pocket expenses for medical treatment. This will be achieved through leadership, the development and implementation of Pan-Canadian policies and programs regarding hepatitis C and through citizen engagement, comprehensive strategic coordination, consolidation and partnership, and performance and accountability. The Hepatitis C Prevention, Support and Research Program forms part of this Division.

The Hepatitis C Prevention, Support and Research Program was developed through consultations with a broad range of stakeholders. Between November 1998 and January 1999, input was provided on needs, priorities, directions, measures and approaches that would most effectively contribute to the above mandate. Consultations included representatives of all major organizations involved with hepatitis C; members of the infected and affected populations; experts in the fields of research, prevention, disease surveillance, treatment, care and community-based support pertinent to hepatitis C; federal and provincial/territorial departments and agencies; and representatives from major national Aboriginal organizations.

Purpose of This Report

The Hepatitis C Prevention, Support and Research Program has undertaken a number of recent initiatives oriented toward advancing the prevention and treatment of hepatitis C in Canada. The primary objective of the present work is to provide an international and Canadian context for a synthesis paper on the prevention of hepatitis C.

a Although it is technically correct to use the phrase "prevent the spread of the hepatitis C virus", for the sake of brevity, we also use the phrases "hepatitis C prevention" and "prevention of hepatitis C".

The report includes an examination of the lessons learned internationally that would be useful to hepatitis C prevention in the Canadian context. Together, the review and synthesis will provide a conceptual architecture and empirical grounding for further work on hepatitis C.

Methodology

We compiled the materials for this report from a variety of sources. The search strategy was based on two major components – a review of the published literature and critical appraisal of governmental and non-governmental documents. We reviewed only English language documents and articles.

A computer and library search of existing published literature on the primary and secondary prevention of hepatitis C was conducted on all relevant databases, including MEDLINE, Psychological Abstracts, Nursing Abstracts, ERIC, CINAHL (Allied Health Disciplines), HEALTH (Health Policy), SOCIOFILE (Sociological Abstracts), SPORT and NIOSH (National Index of Occupational Health and Safety), and the Bibliography of Native Americans. We employed specific search terms and inclusion/exclusion criteria. Inclusion criteria included emphasis on a broad definition of prevention and an attempt to capture the diversity of potential targets, such as Aboriginal people, those in low income groups, and those with little education. Inclusion criteria also included terms to capture those known to be at high risk for hepatitis C, such as people who inject drugs and prison populations.

Second, we attempted to identify key governmental and non-governmental publications from multiple international jurisdictions. We gave a particular focus to documents and resources from the United States, Australia, New Zealand and Western Europe.

Through a wide number of web-based and e-mail channels (e.g., list servers), we asked researchers, program planners, policy makers and others with an interest or involvement in the prevention of hepatitis C to identify possible sources of information, which were then contacted. Among these, some had their own databases that they searched at our request. We also searched the Internet for relevant materials and contacts. Finally, representatives of the health ministries or governments of each country were contacted through the respective consulates. The quality and relevance of the materials gathered depended on our sources and their willingness/ability to share relevant information.

The literature and document review does not focus on information regarding the clinical treatment of hepatitis C. It attempts to focus on the prevention of hepatitis C from the perspective of health promotion, population health, public health and preventive medicine. Although exclusion of clinical considerations was impossible, we intended the review to provide information of relevance to policy makers, decision makers, service providers and health professionals from both health and non-health sectors of government and Canadian society.

Presentation of Results: Target Groups and Prevention Strategies

Included in this report is an examination of hepatitis C prevention in the general population, with a specific emphasis on people who use or have used injection drugs. This group is examined in detail, given its high rate of HCV infection. Other populations that may have been exposed to HCV include prison populations, health care workers, recipients of blood and blood products, people who have participated in skin-penetration practices or are likely to do so, Aboriginal people and children of mothers who have hepatitis C.

Overview of Findings

This section is intended to provide context for the more detailed results that follow. It is divided into three parts. The first part presents general findings pertaining to the prevalence of hepatitis C and routes of transmission of HCV. The second part presents findings that are specific to Canada, namely, drug use and hepatitis C in Canada. The third part presents an overview of Canadian and other national responses to hepatitis C in terms of surveillance, prevention and education, testing and treatment.

General Findings

Hepatitis C in the General Population

An estimated 3% of the global population, or 170 million, are infected with HCV[1]. This is approximately 4.7 times more than the number of people infected with HIV (36.1 million)[2].

In a 1998 report to Health Canada, Remis et al.[3] estimated the number of persons currently infected with hepatitis C (anti-HCV positivity) in Canada to be approximately 240,000 (0.8%)[4]. They also estimated that approximately 4,000 new infections may be expected each year.

In the United States, hepatitis C is believed to be the most common blood-borne infection, with an estimated prevalence of 1.8% of the population (about 3.9 million people). In the European Community, the estimated prevalence is about 0.9%, in the United Kingdom it is between 0.3% and 1.0%, and in Australia it is 1.1%.

Routes of Transmission of HCV

The estimated 3% of the global population infected with HCV provides an easy source of transmission of the virus[b]. Before identification of HCV, the majority of non-A, non-B hepatitis cases were associated with blood transfusions, injection drug use (IDU), occupations in a health care setting, and sexual or household exposure to a contact with hepatitis. The available evidence suggests that direct percutaneous exposure is the most efficient method of HCV transmission in developed countries[5,6]. Transfusion of blood or blood products from unscreened donors is still one of the primary sources of HCV infection in developing countries[7].

Blood Transfusion and Blood Products

Chronic hemodialysis has been a common mode of transmission[8], but transmission by blood products has decreased significantly in Canada and other developed countries. In developed countries, hepatitis C is now very rarely transmitted by transfusion because of screening tests that exclude infectious donors[6], but the risk still exists in developing countries, and transfusion is considered to be one of the primary sources of HCV infection[7].

Injection Drug Use

It is crucial for any prevention strategy in Canada to note that among those who use injection drugs, HCV infection is acquired rapidly after beginning injection drug use. More than half (50%-80%) of those new to injection drug use become positive for HCV within 6 to 12 months, and injection drug use likely accounts for more than half of chronic infections[6].

There is a positive relation between rates and duration of injection use and HCV infection. The steepest trajectory for risk of HCV infection is early in drug use history[9]. The risk of infection is directly related to levels of sharing of injection equipment[10]. Crofts et al.[11] (Australia) concluded that in most studies of risk factors for HCV exposure among people who inject drugs, the strongest association was

b Crofts (personal communication, 2001) presents an excellent cross-national comparison of the epidemiology of HCV genotypes. This work will be available in a forthcoming book on hepatitis C.

with length of time from the first injection. This means that the greater the time that has passed (e.g., 2 months versus 2 years) since a person first injected, the greater the likelihood of HCV infection. There was also a significant difference in hazard between those who started injecting heroin and those who started with amphetamines. The stronger association of hepatitis C prevalence with heroin rather than amphetamine injecting suggests that the association is with frequency of injecting, though this has not yet been demonstrated. Each injection poses a risk of exposure, so with increased numbers of injections over time the risk of infection increases.

Limited evidence suggests that inhaled drug use may increase the risk of HCV infection[12].

Percutaneous Exposure

Tattooing and body piercing has been associated with infections such as hepatits C, hepatitis B, and skin infections.There is documented transmission of HCV with tattoing[13]. It has been suggested that HCV may be transmitted through body piercing carried out in unhygienic circumstances[13]. If the instrument or ink used in tattooing is contaminated, the person receiving the tattoo or piercing can become infected. Transmission of HCV can occur through exposure to infected blood or body fluids, therefore, the "more clients there are who have been infected with a blood-borne pathogen before they undergo skin piercing procedures, the more likely that someone else can be exposed during tattooing, ear/body piercing, and electrolysis *unless the needles and instruments are sterile*"[13].

Sexual Contact

The data regarding transmissibility by sexual contact have been conflicting[6]. Studies involving clients of clinics for sexually transmitted diseases confirm that sexual transmission may occur, whereas others comment that sexual transmission is uncommon[14]. However, even with multiple sexual partners the risk of HCV infection is low in comparison with the risk of infection associated with injection drug use. The risk of HCV infection through sexual transmission may be increased if there is co-infection with HIV[15,16] or other sexually transmitted infections[6].

Health Care Workers and Needle Stick Injuries

There is some evidence for occupational and nosocomial transmission of HCV[6]. Estimates in the United States are that the prevalence of HCV infection is about 1.0% among health care workers[17] but less than 1.0% in the general population[18]. Some may have acquired it from non-work-related sources. Inadvertent needle stick injuries and lack of application of universal precautions are the most likely contributing factors. The risk of HCV infection from needle sticks is 2.7%-6%, which is greater than that for HIV (0.3%) but less than that for HBV(19%-30%)[19]. HCV transmission between patients in dialysis centres may be related to poor infection control practices. Transmission from health care workers to patients has been documented in the U.K. and Spain[20,21], although such transmission is thought to be rare.

Mother to Child

There is limited understanding of the epidemiology of the vertical transmission of HCV. "Transmission might occur *in utero* transplacentally at any time during pregnancy, during delivery or postnatally and the relative importance of each of these routes remains unclear"[22]. Studies have generally not focused on the relative importance of transmission during the intrauterine and intrapartum periods[23]. International studies report a seroprevalence of HCV during pregnancy ranging from 0.4% to 13.7%. Perinatal transmission of HCV between mother and baby has been documented. Boucher and Gruslin[24] summarized several studies of vertical transmission. By merging data from 43 studies conducted around the world over the last 10 years, they calculated the vertical transmission rate to be 7.9%. When co-infection with HIV is reported the risk may be higher. There is considerable variation between the transmission rates in these studies, which may be related to methodologic

differences, differences in the proportion of mothers selected with HCV viremia, the length of follow-up period for infants and the degree of standardization between tests for HCV RNA.

Although there is no confirmed evidence that breast-feeding transmits HCV from mother to baby, there is some controversy especially with the possibility of transmission in cases of cracked or bleeding nipples.

Summary

In developed countries the risk of HCV infection is greatest among those who use injection drugs. In Canada, it is estimated that IDU accounts "for perhaps 70% of all prevalent infections"[25]. It is believed that most of the remainder can be accounted for by "transfusions prior to 1990, occupational exposures to blood, hemodialysis, high-risk sexual activity (multiple partners, history of sexually transmitted diseases), and . . . intranasal cocaine"[6]. In developing countries the main sources of HCV infection include: "transfusion of blood or blood products . . . parenteral exposure to blood through the use of contaminated or inadequately sterilized instruments and needles used in medical and dental procedures; the use of unsterilized objects for rituals (e.g., circumcision, scarification), traditional medicine (blood-letting) or other activities that break the skin (e.g., tattooing, ear or body piercing) and intravenous drug abuse"[7].

Canada and Hepatitis C

Ascribing definitive risk factors for acquisition of HCV infection remains difficult. Injection drug use (40%-70%) is a prominent risk factor. Risk from blood use has been reduced from 3% per recipient in the early to mid 1980s[26] to 1% in the late 1980s[27], to less than 1 in 500,000 since 1999[28].

Drug Use in Canada

Recently, the Canadian Centre on Substance Abuse (CCSA) provided a sociodemographic profile of people in Canada who use drugs[29]. In this study, entitled *A socio-demographic profile of drug users in Canada*, it is estimated that approximately 75,000 to 125,000 people in Canada use injection drugs. The CSSA study concluded that Canadians who use drugs can be characterized as follows:

- Most use drugs infrequently. Only 7.7% of Canadians report using any illicit drug in the previous year. There are indications that illicit drug use is increasing.
- IDU is a significant risk factor for infectious and sexually transmitted diseases.
- Drug use accounts for nearly 1,000 deaths and 7,000 hospitalizations and is related to impaired work and school performance, physical and psychological abuse and criminal activity.
- In Vancouver, it is estimated that 88% of people who inject drugs have hepatitis C and the annual incidence of hepatitis C among those who inject drugs is 26%.
- The general portrait of people who use illicit drugs is that of young, unattached individuals with limited resources. Approximately 25% of those who have reported ever using an illicit drug are female.
- Drug use is particularly high among Aboriginal people, street youth and incarcerated Canadians. It clusters in urban centres, but there are substantial numbers of users in most provinces and in both rural and urban communities.
- People who inject drugs tend to have low income and education. Most are not fully employed. These and other factors (i.e., homelessness) present barriers to prevention and treatment.

- The development of effective interventions is limited by the marginalization of people who inject drugs. The intersection between drug use and infectious diseases such as hepatitis C is increasing.

Incidence of Hepatitis C in Canada

The information presented in this section is based on data obtained from Health Canada's Centre for Infectious Disease Prevention and Control (CIDPC, formerly known as LCDC). CIDPC has data for reported cases of hepatitis C infection in Canada starting in 1991[c].

The number of reported cases in Canada peaked in 1998 (21,885); preliminary data show that in 1999, there were fewer newly reported cases (16,057). The preliminary data for the first half of year 2000 indicate that there were 7,338 reported cases; doubling this to get an estimate of the total number for that year (14,676) suggests that the number of new cases will be about the same as, or slightly less than, that for 1999. From January 1 to October 31, 2000, there were 11,463 reported cases. Preliminary data for 2001 also show a decline in the number of reported cases of HCV infection: 7,738 cases between January and July as compared with 10,194 cases for the same period in 2000[30].

Although the number of reported cases may be stabilizing, the numbers are not small (14,000 or more for 5 consecutive years). There is a need to focus on prevention so that the numbers do not increase. In no province or territory does there appear to be any increase in the number of reported cases after 1998 (a similar trend to that in Canada overall). From 1995 to 1998, the incidence rates per 100,000 in British Columbia and the Yukon have been much greater than in the other provinces and territories. Beginning in 1998, the number of reported cases have been highest in Ontario, B.C., Quebec and Alberta. The implication is that the primary focus should be on Ontario, B.C., Quebec and Alberta.

Overview of Canadian and Other National Responses to Hepatitis C

In Canada, Health Canada published *Prevention and Control of Hepatitis C: Guidelines and Recommendations* in a supplement to the Canada Communicable Disease Report in 1995, and in 1999 published *Hepatitis C Prevention and Control: A Public Health Consensus*. In June 1999, $50 million over 5 years was approved for the Hepatitis C Prevention, Support and Research Program.

The prevention component of the Hepatitis C Prevention, Support and Research includes targeted efforts of preventing the spread of HCV among those who are currently uninfected, particularly those at high risk of HCV infection, such as injection drug users. The program acknowledges that because hepatitis C is a complex and sensitive issue, increasing the public's awareness and knowledge about hepatitis C can only be accomplished in collaboration with other agencies, organizations, community groups and dedicated individuals. With this need for collaboration acknowledged, the Program encourages and funds the development of tools and information materials to support activities at the national and local levels[31].

Work to collect data includes national surveillance of HCV since 1991 under CIDPC, all provinces/territories reporting by 1999.

The results of the European survey on hepatitis C show marked variation in the level of importance that different countries assign to hepatitis C as a public health concern[32]. It was found that hepatitis C is not regarded as an important public health concern in most of Europe: nine of the 15 countries in the European Community described it as of moderate importance. It was described as a major problem in France, Italy, Denmark and the Netherlands and as a minor problem in Ireland and the United Kingdom.

c Note that before 1999, Nunavut was included in the data for the NWT. Also, the CIDPC data do not include reported cases for Manitoba (Manitoba data have been collected by Cadham Provincial Laboratory).

The U.S. Centers for Disease Control and Prevention (CDC) is completing guidelines on national policy in its document *A Prevention and Control Plan for Hepatitis C Virus Infection*[33]. The CDC has established the National Hepatitis C Prevention Strategy, which has goals "to lower the incidence of acute hepatitis C in the United States and reduce the disease burden from chronic HCV infection"[33]. There have also been efforts to integrate HIV and HCV prevention efforts, given that three times more Americans were estimated to be infected with HCV (2.7 million people) than with HIV. However, "[in] 1998, the total CDC funding available for hepatitis C control was under $5 million, while the agency's HIV budget was about $625 million"[34]. In the 2000-2001 fiscal year, the CDC awarded 15 grants totalling nearly $1.7 million "to help states and counties integrate viral hepatitis prevention into HIV and STD programs"[34].

Australia's government, in 1993, "established a joint task force of the National Health and Medical Research Council and the Australian Health Ministers Advisory Council to report on hepatitis C"[35]. In response to this report on hepatitis C, the National Hepatitis C Action Plan was formed in 1994. Under the direction of this plan, Australia allocated $3.8 million over 2 years beginning in 1995-96 for national surveillance and education. By 1997 this funding was included in the budget of the Public Health Division of the Department of Health and Family Services. A similar level of funding was maintained for 2 more years. By 1998, the government added an additional $1.7 million for hepatitis C research and programs[35]. In 1999, Australia established the Australian National Council on AIDS, Hepatitis C and Related Diseases, giving hepatitis C a platform at the national advisory level[36].

Surveillance

Surveillance of hepatitis C prevalence and incidence in global populations presents a number of important difficulties, principal among them the fact that hepatitis C infection is largely under-reported in routine notification systems and that multifaceted approaches are needed to detect cases and determine the extent of infection at a population level.

Despite limitations, global surveillance data and published studies in specific populations have established that a large number of people are chronically infected with hepatitis C globally and infection continues to be transmitted. Studies of people who inject drugs consistently show high rates of hepatitis C infection and a high incidence of new infections in new initiates. A number of countries are working to enhance their surveillance efforts using routine notification, screening and sentinel surveillance in higher risk populations in order to provide more reliable information about the epidemiology of hepatitis C.

In Canada, hepatitis C has been a reportable disease in all Canadian provinces and territories since January 1999[4]. The objectives of this surveillance are as follows:

- monitor the occurrence, presence and trends of hepatitis C in the Canadian population;
- investigate the factors that affect the occurrence, progression or intervention of hepatitis C;
- assess the risk of HCV infection to the safety of blood, blood products, tissues and organs;
- recommend intervention measures for the prevention and control of hepatitis C in Canada;
- evaluate the effectiveness of intervention measures against hepatitis C[37].

It should be noted that although surveillance is important, the data are limited because most cases of hepatitis C are asymptomatic, the disease progresses slowly, and laboratory tests do not differentiate between acute and chronic infections. To address this problem, general, enhanced and targeted surveillance activities are being conducted[4], as follows.

General and Enhanced Surveillance

- Analysis of national identifiable disease reports
- Analysis of mortality, morbidity and other data
- Enhanced surveillance for acute hepatitis B and acute hepatitis C and relevant risk factors

Targeted Surveillance and Special Studies

- Aboriginal people, health care workers, infected patients
- At-risk populations: IDU, street youth, prisoners
- Risk behaviour surveillance
- Vertical and sexual transmission of hepatitis C[37]

Vingoe et al.[38] found substantial differences in the surveillance systems in the countries they evaluated (i.e., France, Germany, Ireland, the Netherlands and the United Kingdom) for the European Monitoring Centre for Drugs and Drug Addiction. In Germany, notification of all hepatitis C diagnoses is mandatory, but this is not enforced; under-reporting is estimated at around 80%. In France, there is a voluntary surveillance system involving a 1% representative sample of physicians. In Ireland, there is no national surveillance for hepatitis C, although the Department of Health plans to establish a Communicable Disease Surveillance Centre to monitor hepatitis C. In the Netherlands, hepatitis C prevalence has mainly been assessed through surveys of people who inject drugs.

Surveillance in the United Kingdom is undertaken through clinicians and is based on symptomatic presentation with non-A, non-B hepatitis. There is a separate notification system for positive hepatitis C serologic results through public health laboratories in England and Wales[38]. The Public Health Laboratory Network at the Communicable Disease Surveillance Centre undertook enhanced surveillance with a view to extending the laboratory reporting system[39]. It was found that risk factor data are requested by public health laboratories but that not all laboratories participate in the notification system and there is substantial variation in the completeness of the information provided.

Vingoe et al.[38] concluded that data on risk behaviours are very limited. Data on seroprevalence in population groups at higher risk are not routinely collected in most countries, and risk behaviours are poorly linked to prevalence data in the general population. Most countries have been unable to distinguish between prevalent and incident cases, which means that information on current transmission rates is unavailable.

In the United States, the CDC's Notifiable Diseases Surveillance System includes notifications of hepatitis C. A variety of surveillance methodologies are used to gauge the prevalence of the disease. The Sentinel Counties Study of Acute Viral Hepatitis has been running in the United States for 20 years and has followed changing patterns in the incidence of hepatitis C. The Study recorded substantial drops in transfusion-induced cases after the introduction of measures to exclude potentially infected donors in the mid-1980s.

Among the main risk factors for hepatitis C infection identified by the Study are injection drug use and sexual contact. The Study has also reported an 80% decline in incident infections since 1989. With such a large decline, the CDC has found that the Study's ability to detect overall trends in incidence is reduced and recommends that it be expanded in order to continue to provide reliable and accurate information[33]. Serologic surveys are also conducted periodically at national, state and local levels to monitor the prevalence of hepatitis C infection in the United States. The CDC conducted the third National Health and Nutrition Examination Survey between 1988 and 1994, and this provided reliable data on the prevalence of hepatitis C infection in the United States from a representative sample of the population.

Data from New Zealand (1999) suggest that a comprehensive surveillance strategy must include tracking of the incidence of HCV infection through routine reports, sentinel populations, and serially tested populations; tracking of the prevalence of HCV infection in high-risk groups; and monitoring of long-term outcomes of HCV infection.

Prevention and Education

In both the United States and Canada, the identification and diagnosis of people with hepatitis C infection are regarded as central to the prevention of further transmission and to disease monitoring and treatment. At present, the most important risk factor for contracting hepatitis C is injection drug use. This factor alone accounted for 63.2% of acute hepatitis C cases in Canada for the period 1998-1999[40]. As a result, attention to injection drug use is central to the prevention of the spread of HCV. Harm reduction programs used to prevent the spread of HCV through injection drug use include needle exchange programs (NEPs), methadone maintenance treatment (MMT), educational programs and outreach programs[40].

European policies designed to prevent HIV and hepatitis B transmission through eliminating the sharing of injecting equipment have been considered relevant to the prevention of hepatitis C transmission. The Consensus Conference on Hepatitis C in France recommended that hepatitis C prevention among people who inject drugs be formally incorporated into HIV prevention, including the provision of anonymous screening sites and the availability of harm reduction measures such as NEPs[38]. Almost all European Community countries now have NEPs, and syringes are available without a medical prescription in all but three countries[32].

Unfortunately, the effectiveness of NEPs and MMT is unclear. The study of Hagan et al.[41] of people who use injection drugs and were a part of the Tacoma syringe exchange program. found that use of the exchange led to a significant reduction in hepatitis B and hepatitis C and may have also prevented a substantial proportion of HIV infections. However, in a more recent study in Seattle, these authors concluded that a needle exchange program conferred no protection from HCV after onset of injection and needle sharing was controlled for [42].

Furthermore, a systematic review by Leonard et al.[40] of relevant studies showed that NEPs and MMT were the most frequently described types of intervention. However, high rates of HCV prevalence and incidence were found even where there was widespread implementation of such prevention strategies. Leonard et al. did note that none of these studies had as their main objective the evaluation of the effectiveness of harm reduction strategies in reducing the spread of HCV.

Despite the uncertainty in the effectiveness of various harm reduction approaches, there is a public health imperative to address the hepatitis C epidemic. For one HCV infected individual, the cost for one course of Rebetron treatment may be as high as $30,000[43]. Furthermore, of the 338 liver transplants performed in Canada in 1998[44], an estimated 217 of these were done because of HCV infection[45]. With one transplant costing as much as $250,000[46], HCV-related costs could amount to over $54 million per year for transplants alone. There is currently a study under way to estimate the economic costs of hepatitis C in Canada[43].

Evidence from Australia indicates that the health-related costs of hepatitis C will be high. Brown and Crofts[47] provide evidence of the health care costs (associated with ambulatory visits and in-patient hospital admissions) of a continuing epidemic of hepatitis C among people who inject drugs (who account for the majority of cases of hepatitis C). They estimated that if the 10,000 new HCV infections continue each year for the next 60 years, the direct health care costs would be $4 billion for that period.

National harm reduction approaches such as needle exchanges are not encompassed in the policies of either the CDC or Health Canada. Needle exchanges have, however, been instituted in Canada in response to the HIV epidemic[48,49].

Concern that harm reduction measures encourage injection drug use has prevented the introduction of needle exchanges in most U.S. jurisdictions[50]. The CDC has identified groups at risk of hepatitis C and recommends counselling and health education programs to reduce risk-taking behaviours and to educate infected people about avoiding further transmission. In addition to those who use injection drugs, groups identified as at high risk of HCV infection include people who received donated blood or tissue before July 1990[d], those who received clotting factor before 1987[e], people who have ever undergone hemodialysis, individuals who report having had multiple sexual partners or sex with a hepatitis C infected partner, and the children of hepatitis C infected mothers[33].

Testing

In Canada, the Population and Public Health Branch (PPHB) of Health Canada recognized that "although there is no rationale for systematic, organized HCV screening programs from the public health perspective . . . such programs may be undertaken for the benefit of individuals and for ethical reasons, for example, the testing of recipients of blood before 1992"[25].

In *Hepatitis C Prevention and Control: A Public Health Consensus*[25], it was suggested that, in the context of a comprehensive assessment of the individual's health needs (such as testing for other infections, care and counselling for addiction, consideration of therapy for HCV and follow-up), the primary care provider should offer routine testing to the following groups:

- people who have ever injected drugs that were not medically recommended;
- people who have undergone or are undergoing hemodialysis on a long-term basis;
- people with persistently abnormal alanine aminotransferase levels;
- recipients of blood, blood components or solid organs before 1992 or recipients of blood, blood components or solid organs from an HCV-positive donor;
- people with significant exposure to the blood of HCV infected individuals or to the blood of those at high risk of infection with hepatitis C;
- prisoners in correctional institutions;
- infants of HCV infected mothers or older children of HCV infected mothers if there is reason to believe that vertical transmission may have occurred;

Testing is not recommended for pregnant women, health care workers and students in the health care professions, other occupational groups such as emergency workers, and non-sexual household contacts[25].

Identification and diagnosis of people at risk of hepatitis C has been an important component of the U.S. response. In *Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease*[51], the CDC recommends screening of people in groups identified as being at high risk or having had a recognized exposure similar to those listed for Canada.

European Community member nations began screening donated blood for hepatitis C antibodies between 1989 and 1993[52]. It is assumed that all countries screen organs donated for transplantation, although this is not always specified in official policies. In some countries it is mandatory to screen

d During 1990, donors were tested for evidence of HCV infection. The risk of HCV infection through transfusions or transplants dropped more by 1992 with the use of more sensitive multi-antigen testing[33].

e In 1985 and 1987 procedures were introduced to inactivate viruses, including HCV, in clotting factor concentrates prepared from plasma pools.

donated semen, but in others there are no official policies. In France, hepatitis C testing is recommended for pregnant women; family members of people with hepatitis C; people with a history of blood transfusion, injection drug use, invasive surgery or related procedures; and people whose liver function test is abnormal[38].

A 1998 report released by the South and West National Health Service Region in the United Kingdom examined a proposal to offer screening and treatment for hepatitis C to people who inject drugs and people attending sexually transmissible disease clinics. The report was inconclusive but recommended more study into the costs and health benefits of such a program.

Treatment

In Canada, the current treatment for patients with hepatitis C is a combination of the drugs interferon (IFN) and ribavirin. Previously, IFN was used as monotherapy with lower success rates.

IFN is commercially available in all European Community countries. Nine of the 15 countries also have commercially available ribavirin. Designated reference centres exist in France, Ireland, Luxembourg and the Netherlands. All countries have criteria for the initiation of IFN therapy, although the criteria vary greatly.

Treatment of Chronic Hepatitis C

In March 1999 the Canadian Association for Study of the Liver (CASL) held the Canadian Consensus Conference on the Management of Viral Hepatitis to arrive at a consensus on the management of this disease. The resulting recommendations for the treatment and care of chronic hepatitis C (CHC) are listed below[53].

Recently there have been clinical trials with pegylated IFN (which is a longer acting form of interferon). This combination therapy results in non-detection of the virus in approximately 54% to 56% of patients with CHC[54,55].

Treatment of Acute Hepatitis C

There is now evidence that it may be more effective to provide treatment early in the progression of hepatitis C, even though not all cases of acute hepatitis C develop into the chronic form. Jaeckel, Cornberg and colleagues reviewed evidence and noted that 50% to 80% of cases of acute hepatitis C do progress to chronic hepatitis C[56]. They conducted a study to determine whether treatment in the acute phase of the illness could halt the progression to chronic disease. After 24 weeks of therapy with interferon alfa-2b (not with ribavirin), 98% of the patients "had undetectable levels of HCV RNA in serum and normal serum alamine aminotransferase levels"[56].

Treatment for Chronic Hepatitis C: Recommendations from CASL	
Treatment Factor	**Recommendation**
When to treat	■ The prime indication for treatment in CHC is an alanine aminotransferase (ALT) level of more than 1.5 times the upper limit of normal on three consecutive occasions over more than 3 months. ■ A liver biopsy is recommended for grading and staging of the liver disease. When treating immunosuppressed patients such as renal or bone marrow transplant recipients, a biopsy is mandatory to confirm the diagnosis. ■ It is recommended that response to treatment be defined in virological terms. ■ Many other factors have to be considered before deciding to treat a particular patient. Most important is to try to assess whether the patient will ever develop cirrhosis and liver failure or, particularly in patients over age 50 years, whether competing causes of mortality are more or less likely to cause death.
Treatment type	■ The recommended treatment for CHC is a combination therapy of interferon (IFN)alpha-2b and ribavirin. The dose of IFN is 3 MU TIW, and the dose of ribavirin is 1000mg/day for patients weighing less than 75 kg and 1200 mg/day for patients weighing more than 75kg. ■ IFN monotherapy should only be used for patients who cannot tolerate ribavirin, such as those with anemia.
Treatment responses rates for those treated with combination therapy	■ Overall, about 40% of patients treated with this combination therapy have a sustained response. ■ Patients with genotype 2 or 3 have about a 65% response rate. ■ Patients with genotype 1 have about a 30% response rate.
Treatment duration	■ Patients with HCV genotype 2 or 3 may be treated for 24 weeks. Patients with any other genotype should be treated for 48 weeks. ■ A positive HCV RNA assay after 24 weeks of therapy is an indication to stop treatment. ■ The intended treatment duration of IFN monotherapy is 48 weeks. Response is assessed at three months using the qualitative HCV RNA test.
Defining treatment response	■ Treatment response is to be monitored by the ALT and the HCV RNA concentration. ALT is an imperfect surrogate marker for viral clearance, so HCV RNA testing is mandatory at the appropriate time points (at 12 or 24 weeks of therapy and 24 weeks after completion of therapy).

Injection Drug Use and Hepatitis C

Our appraisal of the evidence leads to acceptance of the reality that a proportion of young Canadians go on to use drugs and a smaller, but crucially important proportion of people, go on to use injection drugs. Although the latter group is the primary focus for preventing HCV infection, we must recognize the accepted knowledge in the substance abuse field that any drug use places one at a somewhat elevated risk for eventual injection drug use and HCV infection. This point is important because it suggests that both groups should be the targets of prevention efforts.

The following statements can be made about the relations between HCV infection and injection drug use:

- For most developed countries (and some developing countries), intravenous drug users have the highest risk for HCV infection than any other group[7].
- There is a strong association between HCV infection and duration of injecting[57,58], with an estimated 92% being infected with HCV if they have injected for more than 5 years[7].
- The more frequent the injecting, the more likely the person is to be infected with HCV[57,59].
- The time lapse between initiation of injection drug use and infection with HCV is quite short[60], an estimated 20% to 40% becoming infected with HCV in the first year[7].
- The type of drug injected is associated with HCV exposure and risk (i.e., cocaine is a greater risk than amphetamines)[61].
- People who use cocaine may engage in high-risk behaviours other than injecting drugs, such as sharing straws to snort cocaine, a particularly high-risk behaviour if nosebleeds occur[62,63].
- Most studies have reported a positive relation between HCV infection and sharing of injection equipment[59,64]; some have not[57].
- Some people who inject drugs are HCV positive, yet claim that they have not shared needles[5,64].
- Some studies are beginning to show a decline in IDU-related risk behaviours[57], but it is unclear whether this decline is associated with a decline in the prevalence of HCV infection (because of the virus's rapid transmission).
- Risk of HCV infection is particularly high in certain populations, such as those in prisons[5,65], Aboriginal people in prisons[43], and Aboriginal people who are young offenders[66].
- HCV has many genotypes and the virus adapts rapidly; this, together with the high prevalence of HCV infection among people who inject drugs and the rapid rate of transmission, suggest that harm reduction measures, though important, are not likely to be enough to stem the epidemic of hepatitis C[5,11,67].

Injection Drug Use and Hepatitis C Prevention Strategies

For the current group of people who inject drugs, the core focus of a comprehensive hepatitis C prevention strategy must lie in reducing the incidence and prevalence of cases of hepatitis C. People who inject drugs but are not infected with HCV represent a small portion of this population. However, given their injection drug use they are at enormously elevated risk for becoming infected. With adequate education, they have a potential role to play in a) reducing their own risks of infection, b) helping others who use injection drugs and are not yet infected with HCV to avoid getting infected, and c) helping those who are infected with HCV to reduce their risk behaviours. Individuals infected with HCV have an equally important, similar set of roles to play in reducing the incidence and prevalence of hepatitis C.

Once those who use drugs begin injecting, the shift of prevention activities turns from prevention of injection drug use to prevention of the sharing of injecting equipment – such as needles and syringes, cookers, water and cotton – and prevention of mixing activities such as "backloading" and "frontloading." Peer norms have been shown to be important predictors of risk reduction activities. In a study comparing the efficacy of verbal persuasion versus peer behaviour (modelling), "it was determined that subjects who reported observing more peer protective HIV related behaviours were also more likely to report lower frequencies of HIV risk behaviour (unclean needle sharing) and increased frequencies of HIV protective behaviour (always cleaning needles)." Reports of verbalizations of peer norms about reducing risk were not associated with decreased HIV risk behaviour. Reports of "encouragement by peers to engage in cleaning needles" was paradoxically related to increased risk of sharing unclean needles. The authors concluded that peer behaviour rather than verbal persuasion appears to influence injection practices[68].

We classify the preventive strategies for reducing the incidence and prevalence of cases of HCV infection among those who use injection drugs into several categories: informational, educational or behavioural; environmental; administrative or structural; and policy, legislative or regulatory. These strategies target the above risk or susceptibility factors and specific behavioural factors. Below, we summarize the available evidence and provide examples from different countries and the lessons learned from different approaches.

Informational/Educational/ Behavioural Strategies

Education is an important component of a risk reduction program. Many people who inject drugs and have reduced their sharing of needles and syringes are not yet aware of the risk involved in frontloading (i.e., using one syringe to mix drugs that are then transferred to multiple syringes), backloading, and sharing of drug preparation equipment such as cookers, water, filters and cotton swabs. Participation in these behaviours remains much greater than in needle and syringe sharing[69-71]. Stark et al.[72] found that front-loading was very common (84%) among Germans who inject drugs. In the group that had done frontloading more than 100 times (46%) the prevalence of HCV was 94%. The lesson they gleaned was that even in communities where sterile injection equipment is readily available, frontloading remains a significant risk behaviour for HCV infection.

Drug education materials with a harm reduction focus aimed at high-risk populations are readily available in some countries, whereas in others they are extremely controversial and often unavailable[73]. "Initiatives that aim to increase awareness of ways to reduce risks associated with substance use include various types of pamphlets, leaflets, and educational sessions and peer outreach efforts aimed at users, potential users (youth in general, street youth, drug users, prisoners, prostitutes)"[74]. These materials explain the risks of IDU, especially transmission of HIV and HCV. In many countries, outreach workers contact people who inject drugs, and they distribute educational material, syringes, condoms and bleach kits. Safe injecting practices are taught by nurses at clinics in the U.K.[73].

Dowsett et al.[75] reported on hepatitis C prevention education for people in Australia who inject drugs. They noted that only a small part of the literature pertains to accounts of educational programs, either as reviews, reports or evaluations. They provided four examples of relevant programs.

TRIBES

The TRIBES project consists of a series of activities to provide education on HIV and hepatitis C prevention to a wide range of carefully targeted, otherwise difficult to access groups or "tribes." Each project is coordinated by a peer educator and targets a particular social network. Through the development of prevention educational materials, it addresses both individual behaviour and the social context that defines the norms relating to the

behaviour. The resources developed by the TRIBES projects are a "strategy for raising discussion about and influencing the individual's and group's social norms." An evaluation of the TRIBES projects argues that perhaps the most important aspect in their success is that each employs a tribe member as a project worker and has tribe/peer representation on its steering committee. The greatest predictor of success was found in those projects that had an optimal balance of involvement between tribe members and professional service providers.

The Peer Education Project

Using peers to conduct outreach programs, particularly "indigenous" peers, has been "shown to be an effective method in reducing HIV risk behaviour and promoting preventive actions among persons who inject drugs in various settings. 'Indigenous' outreach and case workers play an important role in engaging persons who inject drugs and are out-of-treatment, supporting meaningful change in their lives, and responding to their particular and emerging needs"[76].

Counselling as Education

In their study of 24,335 attendees at a methadone clinic who used opiates, Choi et al.[77] found that, after counselling, the majority of current needle sharers (58.3% in 1990, 81.3% in 1995) reported having stopped sharing 2 weeks after the session. However, some argue that such data do not provide good measures of behavioural change, because they simply detect short-term alterations in knowledge, beliefs and intentions. Dowsett et al.[75] report on a pilot, peer-based hepatitis C testing and counselling service. The three different styles of peer counselling will be used and evaluated.

Hepatitis C Risk Assessment and Peer Education Project

The Hepatitis C Risk Assessment and Peer Education Project, in Tasmania, provides peer education to people who inject drugs. This is done in a discussion format and includes the handing-out of free resources containing safer injecting guidelines and information. Evaluation of the sessions showed that there was an effective increase in participants' knowledge of risk behaviours and preventive practices. Although peer education was effective in increasing knowledge, this did not translate into safer behaviours. In fact, 79 of the 80 participants subsequently engaged in behaviours that placed them at risk of HCV infection.

Furthermore, Dowsett et al.[75] noted that education can occur around needle exchange sites, but, that many people who inject drugs do not get their equipment from such sites and there is a need to involve pharmacies and physicians as key sites for preventive education.

Environmental Strategies

Many countries have implemented what we term "environmental strategies." Such strategies are intended to "create supportive environments" and thus enable and facilitate behaviour change related to hepatitis C prevention. Examples of environmental prevention strategies include safe injection sites, "coffee shops," supportive housing, increased availability of needles and condoms, creation of primary/secondary outlets (i.e., mobile), and provision of pharmacy fitpack schemes.

A second set of environmental strategies involves the creation of collateral social services. They can be related to skills or capacity building through employment training, social integration and reintegration. Social support strategies change the environment by offering advocacy, self-help, self-care, mutual aid groups and peer support programs. Environmental strategies also involve increasing the availability and accessibility of resources for preventive medicine. These include provision of legal drugs (i.e., heroin, methadone), detoxification programs, increased medical treatment and methadone maintenance units. These "medical" strategies are integrally related to a set of public health/nursing strategies that includes

outreach programs, street nursing, surveillance/ tracking programs, databases, syringe cleanup hotlines, and foot patrols.

The following environmental strategies all involve the provision of services, products and/or opportunities to people involved in injection drug use. No one strategy or group of strategies is inherently more useful or efficacious than any other. Some strategies have been more widely used, and some have been more carefully and fully evaluated than others. No one strategy will be enough on its own to combat the spread of hepatitis C successfully. Although a reduction in injection drug use and in sharing syringes/needles has reduced the rate of HIV infection, because of the high prevalence of HCV infection among those who inject drugs and the extremely high infectivity and transmissibility of the virus, only a complete elimination of sharing equipment with no blood contact between persons who use drugs or, better still, a complete elimination of injecting will be enough to stem the tide of HCV infection[78].

The Four Pillar Approach

Holland, Switzerland and Germany have developed innovative and effective strategies to address problems associated with drug use. Typically, these strategies involve coordinated efforts among health care providers, police and the judicial system, and there is a large body of evidence suggesting these more comprehensive approaches have been highly successful.

Following large increases in consumption of illicit drugs in the 1980s and the development of open drug scenes, Switzerland and Germany both developed a "four pillars" approach to managing problems associated with drug use. The four pillars are prevention, harm reduction, treatment and law enforcement. Key to the success of this approach has been the high level of coordination among the four elements. Prevention initiatives have an educational, health promotion focus aimed at those who do not use drugs (including children) and those who use drugs only occasionally. Street-level harm reduction services are provided for those who continue to use drugs, and abstinence-based treatments and other complementary programs are available for those wanting to exit the drug scene[79]. Enforcement strategies have been developed both to assist with health initiatives and to tackle organized crime. The police have generally shifted their focus from arresting people who use drugs to identifying and charging those involved in the supply side of the drug problem, such as suppliers and non-addicted dealers.

A critical component of the four-pillar approach has been the creation of many street-level low threshold services. According to MacPherson[79], threshold "refers to the eligibility criteria for entrance into programs and the state of readiness of individuals to participate and meet the demands of the various programs". Switzerland has developed a range of low threshold harm reduction services to bring as many people who use drugs as possible into contact with health services. The two primary goals are improved public health and increased public order[79]. Low threshold programs include easy access to methadone, shelter beds for those who use drugs, needle exchange, outreach worker programs, employment programs, and methadone treatment in prisons[79].

Methadone Maintenance Programs

Riley et al.[73] note that methadone maintenance programs have been developed in many high income countries, prescribing methadone through clinics and general practitioners. In some European cities, mobile clinics and methadone buses deliver services to people who use drugs.

The evidence suggests that successful programs can reduce illness and death, reduce crime, prevent the spread of HCV and HIV and enable people who use drugs to take greater control of their lives. Methadone programs offer addicts a measure of social reintegration that may ease treatment and successful rehabilitation. In their review, Riley et al.[73] conclude that methadone programs

work best if they are accessible, flexible and provide effective coverage through a range of channels.

Needle Exchange Programs

Needle and syringe exchange programs have come to be a core component of the harm reduction approach[73]. Their rationale is reality-based, i.e., many people who inject drugs are unable or unwilling to stop injecting drugs. The supply of sterile needles, syringes and injecting equipment is a simple, inexpensive way to reduce their risk of HCV infection and the risk of transmission. Many countries also distribute bleach kits as a means of further reducing risk[49,80-85].

Although many reviews of needle and syringe exchange programs show that they are somewhat effective in controlling the spread of HIV, the Australian Needle Exchange Study suggests that they are also "having an effect on limiting the transmission of HCV"[86]. The sharing of needles is reduced and safe disposal of needles increased by use of a needle and syringe exchange program, while drug use is not increased. In fact, drug use tends to decrease, especially if these programs include counselling and referral to treatment. "There is now clear evidence that attendance at syringe exchanges and increased syringe availability is associated with a decrease in risk (e.g., decreased sharing) as well as a decrease in harm (e.g., lower levels of HIV infection)"[73].

NEPs are not totally effective in eliminating needle sharing. One reason for this is that most programs are under-resourced: they may not have enough needles and syringes to distribute (e.g., a study in Montreal[3] showed that less than 5% of the need for sterile needles was being met through pharmacies and the NEP) or their hours or locations are not sufficient to ensure that people who inject drugs can always access clean needles when needed.

Another reason is the nature of social and sharing relationships. Most people who inject drugs are introduced to injecting by a friend or partner, many of whom share a needle with them on this first occasion. When beginning to inject, those who use drugs do not readily identify themselves as people who inject drugs and do not see the needle exchange as relevant to them. Some NEPs require evidence of track marks before they will distribute needles/ syringes. In the context of a friendly or intimate relationship, sharing implies trust and caring, whereas refusing to share may cause feelings of suspicion, alienation and lack of trust. These feelings have been well documented previously in the literature examining factors facilitating and preventing the use of condoms in risky sexual situations. Other reasons for continued needle sharing by some who inject drugs include unaddressed mental health and psychosocial issues.

Automated syringe exchange machines are now being used in many European and Australian cities. These vending machines release a clean syringe when a used one is deposited. Such machines are fairly inexpensive and accessible on a 24-hour basis. The machines, however, decrease the important personal contact between those who use drugs and health care workers[73].

Over time, NEPs are likely to cease to be protective if they do not cut syringe circulation times to low enough levels[49,85]. Other concomitant services are needed. There is a need to educate people who inject about the safe sharing of drugs, so that HIV and other viruses are not transmitted by syringe-mediated routes. "Users are already aware that sharing injecting equipment is dangerous, but they are not all aware of the risks of injecting drugs that have been contaminated in someone else's syringe"[82].

Alcabes et al.[82] reported on pilot studies of NEPs in Poland. Their results provide a key finding for the prevention of transmission of HCV, and that is that even intensive programs fail to cut syringe circulation times. The majority of (labelled) needles remained in circulation 1 month after distribution. They also concluded that, at some point, needle exchanges will cease to be protective.

Safe Injection Sites and "Tolerance Areas"

In conjunction with a harm reduction philosophy, several European cities and Australia have developed safe injection sites. These facilities are variously known as "tolerance zones," "injection rooms," "health rooms" or "contact centres"[73]. They provide sterile injection equipment, condoms, advice and medical attention. European countries such as the Netherlands see these locales as a key strategy for eliminating street drug use and public nuisance.

Although several countries have instituted supervised sites for "safe" injection as part of their harm reduction program, there is vocal public resistance to this strategy in other countries. Their purpose is to increase hygiene by prohibiting sharing of drugs and provision of sterile equipment, to teach safe injection practices if necessary and to provide immediate response to drug overdoses and other needed medical care. Most "health rooms" or "consumer rooms" are staffed with both medical and social work personnel who provide compassionate counselling and referral services as well as the medical services mentioned above. The safe injection sites require strictly enforced rules for people who inject drugs and protocols for staff protection. Research examining the environmental context of drug use has shown that higher-risk needle sharing behaviours are "associated with reports of injecting in semipublic areas (streets, rooftops, parks, cars, public bathrooms, and abandoned buildings)"[87].

Compared with needle exchange and outreach programs, safe injection facilities typically offer a more direct approach to the prevention of drug-related problems and the use of medical and drug treatment, and other health care services. Within safe injection facilities, staff are able to engage directly with people who inject drugs after they have injected. According to Broadhead et al.[88], "this is when drug users are most likely to be at least temporarily at ease and available to reflect and interact . . . staff are, therefore, seen as more favourably positioned than needle exchange and outreach workers to engage drug users in a help-seeking relationship, to discuss health concerns they may have, to provide them with immediate medical and other interventions if desired, or to make referrals".

Heroin Prescription

In several European countries (Denmark, Sweden, the U.K., Switzerland, the Netherlands, Germany), the harm reduction approach includes prescribing of heroin (or alternative drugs) through physicians, clinics or community drug teams[73]. The programs range from short-term detoxification to long-term maintenance and rehabilitation.

Some evidence suggests that drug-related health problems, crime and social nuisance have decreased as a result of these programs. Heroin causes few problems when used in controlled and hygienic conditions[73].

Involvement of Pharmacists

Several countries have actively involved pharmacists in the distribution of methadone, needle exchanges and injecting equipment. This approach appears to be running smoothly in some countries, and not in others. For example, in Switzerland, pharmacies sell both syringes and safe injection kits. It is estimated that from 1993 to 1994, about 3,000 syringes were purchased daily from this source. In the United Kingdom, pharmacies have relaxed their formerly self-imposed restrictions on selling injecting equipment to people who use drugs[89]. In Australia, distribution of sterile injection equipment through pharmacies is an essential component of increased access to such equipment[89].

Community Outreach Programs

Many countries have begun low threshold community outreach programs with non-abstinence goals, such as drop in and counselling programs, which distribute information about risk reduction and provide survival and social support to people who use injection drugs. These types of programs are an essential component of a comprehensive drug use prevention strategy, as a bridge between

those who use drugs but are not in treatment and more intense, demanding treatment approaches. Evaluation of a community outreach program in San Juan, Puerto Rico, showed that above and beyond the secular trends measured, the program contributed to a reduction in risk behaviours (i.e., reduction in the shared use of cookers and an increase in needle bleaching for HIV prevention)[90].

Increased Number of Treatment Facilities or Beds

Most countries on the forefront of addressing injection drug use (and HCV) have substantially increased their number of addiction detoxification and treatment facilities/beds. Many have increased mental health services to people at risk of injection drug use, such as those who have been sexually abused, are depressed, or who abuse alcohol. Canada, however, has not seen such an increase in services.

Administrative/Structural Strategies

The administrative and structural strategies employed in Europe and elsewhere to control hepatitis C and drug use are similar yet heterogenous. A defining characteristic is shared responsibility for a coordinated effort between federal and municipal policy makers.

In Australia, hepatitis C prevention information and other services beyond prevention education are being delivered by a broad range of agencies, from large public health services to correctional services to small non-government organizations (NGOs). There is a recognition that "this diversity of agencies requires a multifaceted approach in any policy and programmatic initiatives developed to enhance the sector's efforts at hepatitis C/IDU prevention education". The Australians recognize that the capacity of these agencies to enhance their current programs requires an examination of their basic infrastructure needs. They report a great deal of willingness on the part of educators to improve their educational programs, but there are currently significant resource and infrastructure constraints on their capacity to effect change.

An example of an innovative administrative intervention is the New Zealand Trust's needle exchange retailer manual[91]. This manual provides detailed information on legal and social issues, program administration, and protocols for addressing risk situations.

A key question for treatment facilities is the locale and legal responsibility of specific services[92]. Several countries (e.g., Switzerland, Sweden, Austria) have explored a combination of mandated treatment together with relocation/regionalization of services. These efforts have had limited success because of the limited resources and capacities of local/regional jurisdictions to deliver effective services.

Policy/Legislative/Regulatory Strategies

Policy must be coordinated, particularly between health and social services agencies and law enforcement. Both must be working toward the same end and supporting the same strategies. For example, Holland has a "successful" drug policy, in that the number of people who use "hard drugs" has remained stable over almost 30 years of a harm reduction policy that focuses on the health and well-being of people who use drugs[93]. The mix and amounts of various components are adjusted as necessary, but the basic philosophy has not changed since a harm reduction policy was initiated.

A key legislative strategy for controlling HCV is the decriminalization/legalization of some aspects of injection drug use. Many countries have moved toward lesser penalties for simple possession of small amounts of narcotics. In Austria, possession of small quantities leads to probation and mandated treatment. Components of the Dutch strategy include separating "soft" and "hard" drug strategies (e.g., making soft drugs available to people who use drugs in a different milieu than hard drugs and fine-tuning law enforcement to avoid stigmatizing people who use drugs), and greatly augmenting services to those who use hard drugs, including needle and syringe exchange, low-threshold (e.g., mobile

methadone distribution vans with no expectation of abstinence) to high-threshold (e.g., therapeutic communities and long-term residential care) programs, and field work on the street and in hospitals in jails, which includes material support and social rehabilitation opportunities[93].

"Expert opinion repeatedly suggests that there is no single solution to the problems related to illicit injection drug use. A balanced and comprehensive approach that combines both enforcement and health-based strategies is key. Considerable resources are currently directed toward drug-related law enforcement. About 82% of the total direct cost associated with illicit drug use in Canada is accounted for by law enforcement however, only 16% of the cost goes toward the provision of health care, and a mere 8% is spent on prevention and research"[94,95].

Synopses of Prevention Strategies Employed in Various Jurisdictions

MacPherson[79] notes that cities in the U.S., the U.K. and Europe have responded to the growing problem of substance misuse (and HCV infection) by adopting a wide range of treatment and harm reduction programs and enforcement strategies. ln all instances, a continuum-of-care approach was undertaken, and strong enforcement efforts were coordinated with prevention and intervention strategies. More important, the result was a marked decrease in deaths and drug-related harm. He notes that while there are differences between the U.S., U.K., Europe and Canada with regard to health care funding, municipal responsibilities, law enforcement and criminal justice approaches, there are also similarities. The following section provides an overview of harm reduction experiences in several other similar countries. It is adapted from the report by Riley et al.[73] and MacPherson[79].

Switzerland

In the late 1980s, Switzerland experienced a huge increase in public drug use, which resulted in large open drug scenes in its major cities. Treatment programs were high threshold and medium threshold services. High threshold services are traditional, abstinence-oriented therapies, residential treatment regimes, recovery houses, etc. Medium threshold services include medical and social care that have well defined therapeutic goals such as methadone programs, counselling and other types of support that require adherence to a structured program.

The Swiss found they were reaching 20% of those who use injection drugs. Individuals had been involved with drugs for an average of 6 years before they received any intervention. People who used drugs had become marginalized and had little contact with the health care system. Canada has experienced similar trends.

The Swiss have developed and carried out a program based on the four pillars of prevention, treatment, enforcement, and harm reduction. Their program balances public health and public order. It emphasizes the importance of providing both harm reduction programs for those who continue to use drugs and treatment options for those who want to quit. Prevention and health promotion are considered to be the most important underpinnings of their strategy. A key element is the development of low threshold services that are easily and immediately accessible. The aim is to create a continuum of care as early as possible. Low threshold services include access to methadone; day centres; shelter beds; needle exchanges; outreach workers and programs; employment programs; safe injection sites; and methadone in prisons.

Germany (Frankfurt)

Most large German cities (e.g., Frankfurt, Hamburg) follow a harm reduction approach that includes law enforcement, methadone maintenance, needle exchanges and "safe injection rooms." Several are preparing to start heroin prescription trials that have the support of the majority of police chiefs[73].

The well-cited "Frankfurt Resolution" states that criminal prosecution should focus on illegal drug traffic, and that harm reduction policies should be pursued to permit people who use drugs to live a life of dignity. In Hamburg, they have adopted a policy of decriminalization of possession of small amounts of cocaine and heroin.

Frankfurt has a comprehensive harm reduction approach with an accessible network of services for those who inject drugs, including day or night rest areas, NEPs, "safe injection rooms" and mobile methadone clinics. Police, city officials and administrators, and doctors collaborate through weekly meetings. A new policy of tolerance exists within an area of one of the parks. The Frankfurt approach has led to a significant reduction in the number of homeless people who inject drugs, decreased drug-related crime and violence, and fewer drug fatalities.

United States

The U.S. approach differs dramatically from that of Australia and most European countries. Although the U.S. has had methadone maintenance programs since the 1960s, policies continue to emphasize prohibition and abstinence, and law enforcement. Unlike the U.K. or the Netherlands, drug use and possession offences are punishable by imprisonment[73].

Despite significant scientific support for needle exchanges, most states have laws prohibiting the sale, distribution and possession of injecting equipment. Federal funds cannot be used for NEPs. A survey of 87 needle exchanges found that 53% were legal, 23% were illegal but tolerated, and 34% were illegal and underground. The current policy approach has not been effective in preventing HIV or HCV infection among people who inject drugs.

Portland, Oregon

The City of Portland created Central City Concern, a non-profit organization that focused on inner-city individuals who were homeless, intoxicated, unstable, and most at risk of becoming seriously ill or dying. These marginalized individuals had a significant negative impact on local businesses and the public perception of safety.

Central City Concern has developed an alcohol and drug treatment continuum that ties together a range of services from sobering and detoxification, transitional and permanent housing, inpatient and outpatient treatment, alcohol and drug free housing, job training, acupuncture services, rehabilitation and repair projects. The model is a result of many partnerships that have helped the coordination of services and support for individuals with substance misuse problems.

Stable housing with treatment for drug and alcohol addiction is a key feature. Housing includes transitional housing, permanent drug and alcohol free housing and permanent housing for low income people. Results show that 30% of people who move through the continuum of treatment and housing return to the community without relapse. By linking detoxification and treatment with stable housing, employment projects and skills development, Central City Concern has created a model continuum of care that has had a profound effect on many individuals and has improved the quality of life in the community.

United Kingdom

Harm reduction in the U.K. includes NEPs; prescribing of drugs, including stimulants, oral and injectable methadone, injectable heroin; community outreach programs; and collaboration between police and health service providers[73]. The Merseyside model is an exemplar of their approach.

The Merseyside region has the second highest number of addicts in the U.K. The Merseyside model is based on the ability of physicians to prescribe drugs, the early establishment of syringe exchanges and cooperation from local police[73]. Most clients receive oral methadone. Some receive injectable methadone or heroin, and a few receive amphetamine or cocaine. The region has pursued a pragmatic response to HIV infection. The model is based on the assumption that the spread of HIV (and HCV) is a greater danger to public health than drug misuse.

Services carried out include decentralized NEPs, outreach workers, prescribing clinics for methadone and heroin, counselling and drop-in facilities. Criminal justice interventions include arrest referral schemes; bail support that allows a client to move toward treatment; and drug treatment and testing orders, a probation initiative aimed at helping drug-using offenders by offering treatment programs rather than incarceration.

One of the main reasons for the program's success is that the police were brought into the picture early on in the planning of health services. The police are represented on advisory committees and trained on drug and health issues by health workers. They have adopted the European policy of cautioning drug offenders and focus enforcement against trafficking. Police have also agreed not to conduct surveillance on clients, not to prosecute for needle possession and to publicly support exchange programs[73].

The Netherlands

The Netherlands was one of the first countries to set up harm reduction programs. The approach is pragmatic and non-judgmental, and includes needle exchanges, information and education, strict law enforcement on traffickers rather than people who use drugs, methadone prescriptions and tolerance areas[73].

NEPs began in 1984 and have been widely adopted. Police stations in Amsterdam provide clean needles. Methadone prescription programs are part of "low threshold programs" designed to regulate and stabilize injection drug use. Riley et al.[73] cite an innovative approach ("methadone bus" project in Amsterdam), in which mobile methadone clinics provide oral methadone, clean needles and condoms. A small number of registered people who inject drugs are taking injectable methadone or morphine. The number of people entering drug-free treatment and social service programs in Amsterdam has more than doubled since the introduction of the methadone bus project and needles. One of the reasons for its success is that these do not require people who use drugs to provide urine samples or to have contact with counsellors[73].

Denmark

The prevalence of HIV infection among people who inject drugs is low, estimated at less than 4%, and appears to be on the decline in Denmark. Almost 90% of the hepatitis C infected cases can be related to injection drug use, and most have been infected within a few years of drug dependence.

The National Report on the State of the Drugs Problem in Denmark[96] reports that Danish drugs policy is based on persistent and targeted prevention intervention, multiple coordinated services and effective control. Prevention is one of the most crucial instruments in curbing the emergence of new drug addicts and is consequently decisive as part of a broad and coherent policy to reduce and combat drug addiction.

The prevention intervention launched to reduce transmission of HCV includes recommending that those who use injection drugs are vaccinated against hepatitis B; however, far from everyone who uses drugs follow this recommendation. Another innovative service is to offer free vaccination. The Danish Prison and Probation Service has recently introduced a program under which all people who use injection drugs may be screened for hepatitis B. Furthermore, as a measure to prevent transmission of the disease, condoms are available in the prisons.

Three elements are traditionally included in drug prevention in Denmark: drugs must be difficult to procure (prohibition); the information level must be high, with a view to building barriers against drug use; and social welfare measures must be ready to provide assistance to addicts.

Poland

Alcabes et al.[82] reported on pilot studies of NEPs in Poland. One of their findings that is key to the prevention of transmission of HCV is that even intensive programs fail to cut syringe circulation times. The majority of (labelled) needles remained in circulation 1 month after distribution.

Australia

Riley et al.[73] note that until the mid 1980s, Australian drug policies and programs were very similar to those of Canada. Since then, Australia has rapidly revised its policies in response to the threat of HIV and HCV infection.

A harm reduction approach was adopted in 1985, which includes needle exchanges, drug information and education programs, and expanded methadone programs. These programs developed more flexible, low-threshold criteria for admission. Several states are increasing the pressure for heroin trials to be started. Australia has an HIV prevalence among people who inject drugs of less than 5%. Riley et al.[73] suggest, however, that efforts to curb the increase in drug-related crime and overdose deaths have been less successful. There are plans to open "safe injecting rooms" in Sydney on a trial basis.

Australia has the most well-developed comprehensive national strategy for addressing hepatitis C. By international standards, Australia responded quickly to the hepatitis C epidemic by enhancing its hepatitis C related education and prevention, treatment and care, and surveillance infrastructure.

The review of the Australian approach concluded that three main strategies may result in sufficient priority being accorded to hepatitis C: presenting compelling data that explain the prevalence and incidence of infection and the implications for health care and social well-being; education of the general community, mainly about the disease itself and discrimination; and encouraging a debate about hepatitis C that places it in the context of the current debate about drug law reform and treatment options.

The central recommendation of the Australian review was to develop a national strategy for taking action in relation to hepatitis C. Australia felt that its strategy should have three main functions: to define the directions and priorities for taking up the challenges identified; to form the basis for implementation of the essential components of an organized national response to hepatitis C; and to clarify the structures that will be used to implement the strategy and the respective roles and responsibilities of all elements of the partnership.

New Zealand

New Zealand has a significant pool of untreated people who inject drugs and present a risk to themselves and the community. Methadone programs tend to be more specialized and centralized than in Australia, Denmark, the U.K. or Holland. New Zealand[97] has moved to a "new model" of services for dealing with people who inject drugs. Important elements of the approach include a key role for physicians, a combination of maintenance, withdrawal and detoxification strategies, creation of therapeutic communities, and specialist clinics. A critical question in this approach is the role and availability of physicians.

Comments from the Office of Canada's Drug Strategy, Health Canada

The draft review *Current Trends in Harm Reduction for Injection Drug Users: An International Overview*[89], conducted by the Office of Canada's Drug Strategy, Health Canada, made the following further points of relevance to hepatitis C and its prevention in European cities and countries:

- The dramatic increase in services (e.g., methadone) in Switzerland has resulted in significant benefits for people who inject drugs and for the community.
- The Swiss heroin trials have produced suggestive positive evidence but require more robust evaluation and longer-term follow-up.
- The "low-threshold" approach of the Netherlands holds great promise for reintegration of addicts into society.
- Future directions in the Netherlands appear oriented toward a wider range of residential and integrated care.
- In the U.K., "community drug teams" have expanded and become a key feature of the harm reduction landscape.
- Australia has shown leadership in its collaborative approach that emphasizes multilevel partnerships (i.e., national, state, local).
- Peer user groups have been a key aspect of Australia's harm reduction efforts.
- The U.S. is experimenting with a range of alternative pharmacotherapies, but strict policies limit their availability and use.
- In Germany, some aspects of psychosocial treatment are mandatory.

This document also provides a useful summary of the Multi-City Study on Drug Injecting and HIV conducted by the World Health Organization[98]. The major conclusions are that methadone is the treatment of choice for injection drug use, and its use has expanded significantly over the past decade. Second, diversified prescription programs are being implemented on a trial basis in several countries. However, the evidence suggests that they require a substantial investment of resources, strong political and public will, and the existence of a comprehensive treatment and rehabilitation system. Abstinence continues to be the ultimate goal in all countries, but most recognize the need for community-based services that address the determinants of health. The rise in cocaine use in many countries presents a new and difficult challenge because no pharmacotherapeutic approaches exist for cocaine addiction.

Harm Reduction

Harm Reduction in Canada

Riley et al.[73] provide a useful summary of the state of harm reduction efforts in Canada. They characterize Canada as taking a law enforcement approach to drug use. They note that despite Canada's obligations under international drug treaties, some provinces (notably B.C. and Ontario) and cities have introduced limited harm reduction programs. These are summarized as follows[73]:

- There are more than 100 NEPs in Canada[f]. Pharmacists are becoming actively involved. Many people who inject drugs do not have sufficient access to sterile injecting equipment. Clean syringes are exempt from paraphernalia charges under current legislation; used syringes are not.
- In many urban and rural areas, community groups, clinics, community nurses and peer programs provide outreach services and education including needle exchange. The coverage is not comprehensive.
- Methadone programs have tripled since the early 1990s, but the number remains low relative to need.

f A more recent study shows that there are now more than 200 needle exchange programs in Canada[40].

- A feasibility study for a North American heroin trial that would include Montreal, Toronto and Vancouver is under way.

Generally, drug treatment services are insufficient in number and mostly abstinence oriented. The needs of high-risk groups are poorly met even in those treatment programs that are available. Pregnant women and women with children have difficulty finding treatment facilities. Few programs are designed to cope with the multiple needs of street youth.

Harm reduction measures have received considerable support from politicians, health care professionals, the public and the media; a Canadian Harm Reduction Network is being established; and BC is working toward adoption of a harm reduction approach with city, provincial and federal involvement.

Does Harm Reduction Work?

In the end, the question remains, does harm reduction work, especially for hepatitis C prevention? Riley et al.[73] made the following observations:

- Needle exchanges have been shown to help reduce the spread of HIV and HCV, decreasing risky behaviours by more than 70%.
- Methadone programs have also been shown to be effective in reducing both risk and harms. MMT is widely employed throughout the world, and is the most effective known treatment for heroin addiction. The success of methadone in reducing crime, disease, death and drug use is well documented. It reduces and often eliminates heroin use among addicts, helps to prevent the spread of infection through reducing needle sharing, is effective outside traditional clinic settings, and is also cost-effective.
- Harm reduction measures do not encourage people to increase drug use or to start injecting drugs. There is no evidence of increased drug use in communities where needle exchanges and community outreach exist.
- Comprehensive, flexible, accessible programs, such as those in Germany, the Netherlands, Switzerland and the U.K., that include counselling, treatment, provision of condoms and other forms of support have reduced the spread of hepatitis C, reduced deaths among those who use drugs and improved their overall health. They also appear to result in a decrease in drug-related crime. The experience of these countries is being used to design policies in Russia, Thailand and Brazil.
- Less comprehensive approaches to harm reduction (e.g., in Australia) have been very successful in reducing infections but less successful in tackling other health and social problems associated with drug use.

In one of the papers most relevant to this report, Leonard, Navarro and Pelude[78] reviewed the effectiveness of harm reduction strategies as they might relate to injection drug use and hepatitis C in Canada. On the basis of their review of the available literature they made the following observations:

- An earlier reported protective effect of needle exchange attendance against hepatitis C[41] has not been consistently sustained[42].
- The marginally protective role of MMT in the control of hepatitis C[99] is not supported in other studies reviewed[64,100,101]. Simple provision of methadone to people who inject drugs and are at risk of infection or transmission is not necessarily effective against HCV transmission. Results from a prevalence study[59] and a risk factor analysis[102] do not support evidence of any protective effect of MMT in the control of hepatitis C. In view of these points, current efforts aimed at the prevention of blood-borne pathogen transmission may be inadequate to stem HCV infection.
- Hepatitis C incidence rates range from 4.2 per 100 person-years[103] to highs of 20.9[64] and 28.6[99]. In settings where prevention measures have contributed to the maintenance of low prevalence and incidence of HIV, transmission of HCV continues at extremely high levels, particularly among younger people who inject drugs.

Leonard et al. reached the following conclusions:

- High hepatitis C prevalence and incidence rates have been reported in a number of studies despite apparent widespread implementation of prevention strategies that appear to have been adequate to maintain a low or lower prevalence of HIV.
- Prevention directed selectively against HIV transmission is only partly effective in preventing HCV infection among people who inject drugs.
- In view of the high prevalence, worldwide, of hepatitis C among those who inject drugs and the high degree of infectivity and transmissibility of HCV, total elimination of HCV-risk related injection behaviours may be indicated.

Leonard et al. recommended funded research to examine (a) the feasibility of implementing intervention strategies aimed at encouraging transition to non-injection forms of drug use, such as smoking, snorting and swallowing, and (b) the effectiveness of such strategies. Second, they suggested research on high dose, methadone treatment programs with complete cessation of injecting. Finally, there is a need for research to document the long-term health, social, and economic consequences of the large numbers of people who inject drugs and are currently infected or soon to be infected[78].

Lessons Learned from Review of Strategies

The following **lessons** can be gleaned from our review of injection drug use and hepatitis C.

Preventing Injection Drug Use

- The incidence of HCV infection is very high among people who inject drugs. Therefore, by themselves, harm reduction strategies will not have a sufficient impact on the incidence and prevalence of hepatitis C. The problem of hepatitis C must be addressed by significantly reducing any use of injection drugs.
- The hepatitis C epidemic could not continue without the ongoing recruitment of new "susceptibles" into the injection drug use population. Therefore, people who inject drugs and those at risk for drug use (e.g., youth, those newly incarcerated) would benefit from increased education regarding HCV infection risks and the sharing of any equipment.
- No substantial reduction in injection drug use (or HCV infection) is likely to be achieved without addressing the antecedents to drug use and the clear challenges associated with the determinants of health among the poor, the marginalized, those in prison and Aboriginal people.
- There is a need to explore alternative prevention strategies such as encouragement of alternative (non-parenteral) methods of taking drugs, such as smoking, sniffing and swallowing.

Route of Transmission of HCV and Injection Drug Use

- Surveillance systems are needed to monitor incidence and prevalence among people who inject drugs (see *Hepatitis C in New Zealand: Estimating Future Prevalence and Impact*[104]).
- The likelihood of being infected with HCV is positively related to the length of injecting history and possibly to frequency of injecting.
- Many people who inject drugs do not, most of the time, knowingly share injecting equipment. The prevalence of HCV infection is so high that transmission will continue at a high rate even with infrequent sharing of needles and syringes.
- HCV may be spread not only by sharing needles and syringes but also by the sharing of other injecting equipment, such as spoons, filters, water, tourniquets, or other surfaces that have been touched through the process of using injection drugs.
- Highly successful HIV prevention programs are not enough to stem the hepatitis C epidemic.

Research

- There is a need for a broad-based definition of "outcomes of interest" that moves beyond simple morbidity/mortality and health services utilization to include indicators of psychosocial and community health.
- Research is needed to identify the exact behaviours or situations contributing to the spread of HCV among people who inject drugs, so that appropriate prevention programs may be planned and implemented.
- Further research is needed regarding the prevention of the spread of blood-borne pathogens.

Needle Exchange and Safe Injection Sites

- Needle and syringe exchange programs have reduced transmission rates of HIV and HBV, but not HCV. Without needle and syringe exchange programs, the rate of HCV infection would likely be even greater.
- Dispensation of syringes/needles through pharmacies and dispensing machines should be examined along with the provision of counselling (by pharmacists) for people who inject drugs. Involvement of pharmacies in the distribution of sterile injecting equipment and collection of used equipment makes equipment more widely available.
- Some sub-populations could be better served through increased outreach (i.e., street youth) and through inner-city needle exchange programs that distribute kits of all needed supplies.
- "Safe injection sites" are a relatively new harm reduction strategy that put people who inject drugs directly in contact with medical and social work personnel and are a setting for teaching and enforcing sanitary injection procedures. They are welcomed by a large number of users of injection drugs, who appreciate both the medical and social safety net that they offer. As well as immediate services, they offer a useful venue for contacting, informing and supporting people who use injection drugs in a movement toward treatment and rehabilitation.
- Safe injection sites/clinics with medical personnel and social workers in attendance hold promise for reducing drug use and HCV infection.

Support Services and Treatment

- There is a need to separate treatment services from counselling services so that patients may seek counselling apart from treatment.
- There is an urgent need to improve and develop support services for people who inject drugs, including drug treatment and shelter[105]. Addressing the hepatitis C epidemic will likely require a substantial increase in the number of treatment beds and services available. Basic human needs, such as nutrition, hygiene and safety, need to be considered.
- Greater involvement by primary care professionals, such as general practitioners, is needed in the care of more stable people who use drugs.
- Vaccinations against hepatitis B are needed to reduce the viral load in infected people. Abrignani and Rosa[106] reported on an Italian study investigating an HCV vaccine. They concluded that such a vaccine is possible but that any vaccine must protect against both single infections and chronic infection by different HCV genotypes.

Methadone Maintenance Programs

- The most progressive countries in the fight to control infections associated with injection drug use and to improve the health of people who inject drugs have greatly increased services to these people. The ultimate goal of these services is to promote abstinence or maintenance on methadone and to eliminate the use of illicit drugs.
- Methadone maintenance, and needle and syringe exchange programs are essential components of the strategy and must be accompanied by other rehabilitative services and programs to help people who inject drugs to be reintegrated into society and to stop injecting drugs.

- Expanded methadone treatment programs that allow for flexibility (tailored programs) and a range of services should be examined. Prescriptions for methadone and other substitution drugs should be available through rigorous, well-controlled programs.
- Distribution of methadone and other substitutes through pharmacies may be more cost-effective and easily accessible but may not provide the level of monitoring and support needed by some users.

Reintegration and Involvement of People Who Use Injection Drugs

- For a large percentage of heroin addicts, methadone maintenance programs, in conjunction with other needed services, are successful in promoting a reduction or cessation of illegal drug use as well as a "normalization" of life circumstances. However, the dose of methadone must be high enough to facilitate complete cessation of injecting. Addicts proceeding to further drug treatment and rehabilitation programs while undergoing methadone maintenance are more likely to become completely abstinent than those without this intermediate step. It is more convenient for both providers and recipients of methadone maintenance if this treatment option is provided as part of regular medical services.
- Increased services such as housing, job preparation and social integration are sorely needed in order to foster the reintegration into society of people who inject drugs and to help addicts to live productive lives.

Governmental and Political

- Respective levels of government (e.g. federal, regional, municipal) need to allocate specific staff and resources to the prevention of hepatitis C and associated drug use.
- Partnerships between groups of users, government, and health professionals are crucial to the planning and delivery of preventive interventions.

Legal Issues and Public Attitude

- Policing and treatment/rehabilitative services need to be more fully integrated into a rapid-response format, wherein people who inject drugs but are not dealers are immediately deferred into treatment and supportive services at the point of their arrest.
- Increased law enforcement and penalties for production, importation and major selling of illegal drugs are a fundamental aspect of harm reduction and hepatitis C prevention. They are necessary because many people fear that harm reduction is equivalent to "going soft" on drugs. For example, in order to garner public support the Dutch (and others) have made it eminently clear that they believe vigorous prosecution of major dealers is a crucial aspect of an effective strategy.
- Reduced law enforcement for use of small amounts of drugs in favour of increased treatment options is warranted.
- Although prescription of pharmaceutical heroin or other drugs may be useful for a small number of addicts for whom other treatment options have not been successful, it is not a popular option with the public, and does not seem to be necessary for the vast majority of users.
- The success of any and all prevention strategies depends on the development of a non-judgmental attitude of helping rather than punishing people who use drugs[107,108] and of concurrently combatting and reducing the stigma, discrimination and harassment faced by people who use injection drugs in their relations with society, in general, and the services to be provided, in particular.

Potential Strategic Directions for Preventing Hepatitis C

Below, we identify three perspectives as potential strategies for preventing hepatitis C in Canada. They include the Australian approach, the Vancouver approach, and the views of the WHO Viral Hepatitis Board[7]. Their strategies are highly consistent with those from the National Institutes of Health in the U.S., from European jurisdictions and from previous strategy documents in Canada.

The Australian Approach

As noted, Australia has a fairly well developed hepatitis C strategy. The document entitled *Hepatitis C: A Review of Australia's Response*[35] presents what Australia's response has been to hepatitis C and what they have learned. The following is a list of guiding principles gleaned from the Australian experience:

- Prevention strategies should be targeted at those groups among whom HCV transmission is currently occurring and at those people who are at highest risk of infection.
- Only those strategies that are judged to have some probability of being effective on the basis of experience and current information should be recommended and adopted.
- Prevention is a continuing and multifaceted activity, not achieved or achievable by one-off or short-term activities or by strategies that consist of a single modality.
- Transmission of HCV is largely preventable through changes in individual behaviour. Education and prevention programs are necessary to bring about such changes, and individuals need support to make and sustain these changes.
- The community as a whole has the right to appropriate protection against infection.
- The legal and custodial systems should complement and assist education and other public health measures.
- Discrimination against infected people and those at risk of infection should be eliminated.
- Public health objectives will be effectively realized only with the active participation of people with hepatitis C and those most at risk. This, however, is significantly more difficult to achieve among the heterogeneous population of injection drug users.
- Specific informed consent should be obtained before any test is performed for HCV. The result should remain confidential, and appropriate pre- and post-test counselling should be provided.
- Governments and employers have a responsibility to provide working conditions and training programs that minimize the risk of occupational transmission, where this is not in conflict with principles of confidentiality.
- Research into the epidemic is essential for effective prevention strategies. Strategies must be guided by up-to-date knowledge of epidemiology and mechanisms of pathogenesis, as well as by information about factors influencing behaviour change.

The Australian national strategy identifies a series of challenges and associated targets and strategies that are highly relevant to the development and execution of an effective hepatitis C prevention strategy in Canada. A detailed report, containing more than 150 recommendations on preventing the transmission of HCV is also available from the Standing Committee on Social Issues of the Parliament of New South Wales. Some of these recommendations include the following:

- Reducing the number of new hepatitis C infections.
- Reducing the prevalence of unsafe injecting.
- Reducing the prevalence of injecting.
- Enhancing education for people who inject drugs.
- Removing legal impediments to prevention.
- Using treatment and care services in secondary prevention.
- Improving infection control.
- Setting achievable targets for education and prevention.
- Developing an effective vaccine for hepatitis C.
- Improving treatment and care for people infected with hepatitis C.
- Getting the research right.
- Extending partnerships.
- Clarifying structures, roles and responsibilities.

The Vancouver Approach

Our review provides strong support for adaptation of the four pillar approach articulated in the *Vancouver Agreement*. In the context of hepatitis C, this approach would include prevention of hepatitis C, treatment of people infected by HCV, treatment of those with health problems due to (injection) drug use, enforcement of drug laws and overall harm reduction. Reviews conducted as the foundation for the Vancouver approach yielded the following lessons from other jurisdictions:

- There is a clear need for coordination of municipal, provincial and federal involvement in prevention of hepatitis C.
- All levels of government have a role to play in the coordination of interventions and the monitoring and evaluation of their impact.
- Current primary preventions are lacking in that insufficient resources are allocated toward areas such as school-based prevention programs, and many prevention efforts are poorly evaluated, if at all.
- There is a clear need for a "continuum of care" from crisis intervention to psychosocial rehabilitation.
- Experiences from the U.S. (Portland) and Europe (Frankfurt) suggest that the connection between stable, affordable housing and treatment is a key aspect of dealing with hepatitis C (and injection drug use).
- Innovative diversion programs (e.g., drug courts) have proven to be an important component of a comprehensive public health strategy in many countries in Europe, and innovative examples (e.g. in Toronto) now exist in Canada that could be expanded and better evaluated.
- Methadone maintenance programs, opiate replacement therapies and heroin prescription have a role to play in the prevention of IDU and hepatitis C prevention. Results from Europe are promising but equivocal for heroin trials, and there remains a strong need for well-evaluated pilot interventions with stronger designs. Similarly, experiences from other jurisdictions support the use of "safe injection sites." In the absence of Canadian data, there remains a need for rigorous pilot studies of their adaptation to the Canadian context.
- Two lessons have emerged from Europe's experience with safe injection sites. First, community involvement (i.e., education, consultation) are crucial to successful policy making. Second, there is a need to ensure that the design, location and rules of these facilities are appropriate to the target population.
- The overall evidence for needle exchange programs suggests that they can prevent disease transmission, aid in overall treatment, improve health and provide a foundation for addressing broader psychosocial needs. Although there is some inconsistency in the

literature, the evidence tends to suggest that needle exchanges can be an important component of a comprehensive hepatitis C prevention strategy.

- People at risk for HCV infection need easy access to broadly available services and resources through a comprehensive network of "low-threshold" services.

Potential strategic directions for improvement in the prevention of hepatitis C can also be drawn from the excellent review conducted in the context of the *Vancouver Agreement*:

- Establish an independent hepatitis C commission.
- Improve education for the public and emergency service providers on how to deal with hepatitis C.
- Provide more facilities for detoxification, treatment, recovery and outreach, including needle exchange and methadone treatment.
- Within the overall framework of harm reduction, review the feasibility of providing a heroin maintenance program.
- Provide more substantial funding for supportive recovery programs.
- Provide better education to health professionals and service providers to give them a greater understanding of hepatitis C, associated risk behaviours and health problems.
- Establish educational programs in parenting and life skills, and job placement strategies for welfare recipients.
- Increase the availability of appropriate housing options, such as community homes, independent living apartments, safe houses, and transition houses for recovering addicts, and ensure that accommodation standards are met.
- Establish treatment centres for family substance abuse.
- Provide adequate day care, travel, and financial support to mothers attending substance abuse treatment programs.
- Improve access to detoxification facilities for young people who abuse substances, and develop follow-up programs for parents and youth.
- Invite Aboriginal people to participate more fully in the planning of regional and local HCV-related services and programs.
- Ensure that the mentally ill have the necessities of life and community support.
- Provide alcohol and detoxification treatment programs and mandatory educational programs for young offenders.
- Develop locally relevant teaching modules within the secondary school curriculum that deal with life skills, substance abuse, risk of hepatitis C, coping and parenting.
- Consider the feasibility of decriminalizing the possession and use of specified substances by people addicted to using drugs.

The most recent elements of the Vancouver approach have been announced as including pilot prevention projects for high-risk inner-city children between 8 and 13; a treatment centre for addicted young people with a program of up to 2 years; a pilot project aimed at getting young people out of the sex trade; a public education program for parents; an increase in availability of methadone for 2,000 new clients; and a renewed emphasis on removing discarded needles from public places (Vancouver Sun, April 20, 2001). On June 4, 2001, Health Minister Allan Rock confirmed that over the next 2 years more than $3.2 million will be contributed to the province of British Columbia for drug and alcohol treatment and rehabilitation[109].

The World Health Organization Approach

The WHO Viral Hepatitis Board[7] arrived at the following strategic directions for prevention of HCV infection on a global basis:

- There remains a need for preventing the transmission of HCV from blood or blood products.

- Health professionals and the public should be educated about the best available evidence on the risks and routes of HCV transmission.
- Practitioners of non-traditional health practices, such as acupuncture, as well as those providing services involving skin penetration (e.g., tattooing) also need to be educated about the best available evidence on the risks and routes of HCV transmission.
- Occupational exposure to HCV should be minimized through education and use of safety procedures.
- Information regarding the risk of acquiring HCV through injection drug use needs to be delivered in programs aimed toward preventing and/or reducing drug use, and should be incorporated into HIV program messages.
- Patients and the general public should be advised that the risk of HCV infection through sexual transmission or household articles is low, but not non-existent.
- There is a need for economic analysis of the cost-benefit effectiveness of HCV screening; screening is recommended for transplant or transfusion patients, people receiving plasma products, those who inject drugs, chronic hemodialysis patients, and partners of HCV positive people.
- Routine screening for HCV is not recommended for pregnant women or all health care workers, and is not recommended in routine blood screening in settings with limited resources.

Canada and the Prevention of Hepatitis C

Health Canada[25] reports on the recommendations of six working groups (looking at surveillance, public health interventions, public health laboratory issues, issues pertaining to those who inject drugs, education and blood supply issues) assigned during the 1998 national consensus conference. There are several recommended elements to the Canadian strategy:

- Surveillance should be in place to monitor newly identified infections, document risk factors; support evaluation of preventive programs etc.
- Testing for HCV infection needs to be established for all people with risk factors, such as a history of injection drug use, in the context of a comprehensive assessment of the individual's health needs; such needs may include testing for other infections, such as HIV, care for addiction, counselling, consideration of therapy for HCV, and follow-up;
- People with multiple sex partners should practice safer sex through the use, for instance, of barrier methods. Overall, longstanding sexual partners do not need to change sexual practices if one of them is infected with hepatitis C. However, partners need to be informed that although the risk is low it is not absent, and barrier methods are available.
- Data on risk factors should be collected: specifically, public health should follow up with the physician or primary care provider to determine whether there is a history of blood donation or receipt, and if so to share this information with the Canadian Blood Service or Hema-Quebec (CBS/HQ). There is a need for public health and CBS/HQ to share database information (e.g. names of all HCV positive people to be checked for past history of blood donation); a legal and ethical basis for this is required.
- Since HCV infection is acquired very rapidly after initiation into injection drug use, prevention efforts should target above all (but not exclusively) people new to injection drug use and those who are contemplating injecting. Hepatitis C prevention programs should adhere to the harm reduction model as a health promotion strategy and should include needle exchange; safe injection sites; access to sterile drug use paraphernalia; greater access to detoxification and rehabilitation services, particularly for minors and young adults; well-coordinated and integrated health care services; user advocacy groups; life skills programs; and low threshold substitution therapy.

- A federal-provincial advisory committee should be created to ensure that a hepatitis C national action plan on injection drug use is implemented; where there is significant overlap of issues, other blood-borne infectious diseases often found among people who use drugs should also be addressed by the committee.
- People who use drugs themselves must be included at all levels of discussion and intervention. This involves the creation and provision, at federal/provincial/territorial levels, of resources for and continuing support of groups of people who use drugs.
- Educational materials should be developed with client groups and disseminated through existing networks, such as methadone clinics and needle exchange programs. Piggybacking on existing HIV/STD programs, which themselves are inadequate, would require additional resources.
- There is a need for improving the public's attitudes toward people who inject drugs; this involves promoting the view of drug use as a health rather than a criminal issue. A national committee should be established to review current drug laws. Social isolation and exclusion need to be addressed, since they can increase the risk of HCV infection.
- Outreach services should be directed to those new to injecting drugs, with education about alternatives to injection and about safe injection practices. Community level interventions need to update drug education programs for youth.
- Preventive measures available in the community should be available in the prison setting.
- The development of a federally led national awareness campaign should be a high priority. This could include a national clearinghouse, where information pertaining to hepatitis C is readily available for health care providers, patients, and the general public. This should include a 1-800 telephone number that is printed on all paper (or internet) distributions of hepatitis C information.
- The general public associates HCV infection with blood transfusion and not with injection drug use. Educational interventions must be targeted to high-risk groups but also to public and health care providers. Educational programs must be intensive, sustained and culturally appropriate.
- Through discussion with universities, schools and professional organizations, case-based curricula should be developed for health care providers that take into account their knowledge and comfort when dealing with people who use drugs and related issues. Newsletters, journal inserts and fact sheets (for use by health care providers in counselling) should be developed.
- Counselling should be provided against sharing personal hygiene products.
- Counselling against becoming pregnant is not recommended; although there is some controversy over breastfeeding and transmission of HCV, breastfeeding is recommended unless the nipples are bleeding or cracked.
- Regulatory measures need to be developed to ensure body piercing services are delivered safely.
- Research should be carried out to determine why initiation into injection drug use occurs; determinants of drug use reduction and cessation; non-medical steroid use and HCV; methadone etc.
- A comprehensive health approach needs to be taken in schools and other settings that deals with primary prevention and harm reduction, giving particular attention to injection drug use and other risky behaviours.
- Education and support should be in place for workers dealing with high-risk groups.

Summary of Strategic Directions

This section presents a synthesis of observations drawn from hepatitis C prevention efforts in developed countries with substantial information adapted from Crofts and Wodak[58]. It provides potential strategic directions for programs and policies that Canada could undertake as a result of the international experience in the short and long term.

General Directions and Research

- A strategic plan for best practice hepatitis C prevention education could be developed, including objectives, principles, target populations and monitoring and evaluation.
- All health departments, user groups and hepatitis C organizations should adopt a common approach.
- Efforts to improve monitoring and surveillance of hepatitis C could be supported to track the epidemic and inform policy and programs.
- All jurisdictions could monitor the delivery of prevention strategies to high-risk groups with evaluation of outcomes measured against agreed upon targets.
- All jurisdictions could explain to the community the public health priority of measures to control hepatitis C among people who inject drugs.

Needle Exchanges

- User groups, needle and syringe exchange programs and hepatitis C community groups could have enhanced funding to enable a sustained contribution to hepatitis C prevention.
- All jurisdictions could aim to maintain a 10% per annum growth in needle exchanges through enhanced funding, improved efficiency and deregulation of sales of injecting equipment.
- The provinces and territories could jointly develop a plan for injecting equipment programs, harm reduction and safe injection sites, which should be evaluated in different locations.
- All jurisdictions could consider the possibility of partial deregulation of injecting equipment and monitor the costs and benefits.

Treatment

- The capacity of the drug treatment system could be expanded to meet unmet needs, and the range of treatments broadened and provided in proportion to need.
- Methadone treatment could be expanded by 10% per annum, with adequate quality control and a commitment to explain the benefits of this treatment to the community.
- A strong commitment could be made to support research to improve treatment effectiveness and evaluate new treatments.
- The results of the Swiss heroin prescription trials could be reviewed with a view to considering a similar research trial.
- The number of people enrolled in expanded pharmacotherapy could increase 10% to 15% per annum with adequate quality control.
- Educational and clinical interventions could be developed to (a) facilitate a transition to non-injecting use of drugs among those people who inject drugs and are unable or unwilling to abstain from injecting, and (b) delay or reduce initiation of injecting among people new to using drugs.
- Anti-viral treatments could be provided on a scale and in a manner that will contribute to hepatitis C control.

Legal Issues and Prisons

- Diversion of selected offenders to non-custodial sentencing options could be increased.

- Corrections departments in all jurisdictions could establish or expand educational programs for inmates and correctional officers, bleach distribution, methadone programs and research trials to evaluate the costs and benefits of prison-based needle exchanges and safe injection sites.
- All urine tests for cannabis in correctional centres could be discontinued, and treatment of drug problems in prisons could be of the same standard as in the community.
- A research trial to evaluate a pilot needle exchange and a safe injecting facility could be conducted in a remand centre, and measures to reduce hepatitis C in adult prisons could be considered for youth-oriented facilities.
- Tattooing in prisons could be decriminalized and regulated, and the costs of shaving equipment and toothbrushes for inmates be substantially reduced to decrease sharing.

In the end, a comprehensive hepatitis C prevention strategy must include strategies to reduce the use of drugs, to decrease injection drug use, to reduce the transmission and spread of the virus, and to deal with the impact of hepatitis C on the health and well-being of all Canadians, infected or not. A comprehensive hepatitis C prevention strategy must also address the factors underlying the cause of high-risk behaviours, that is, the determinants of health.

A Comprehensive Hepatitis C Prevention Strategy

The overall evidence suggests that control of the hepatitis C epidemic in Canada will depend on the implementation of a strategy not unlike that proposed in Health Canada's working document

Reducing Harm Associated with Injection Drug Use in Canada[43]. The core of the strategy will be drug treatment and rehabilitation, and addressing the societal antecedents to drug use.

Although **treatment and rehabilitation services** in Canada have evolved significantly over the past several decades, there is clearly a need for expansion of existing services and rigorous evaluation of innovative, perhaps even controversial, approaches.

Methadone maintenance must be a key pillar of any strategy. Several countries (Australia, Germany, Holland, the U.K., Switzerland) have expanded these programs, and there is some evidence of a positive impact on hepatitis C. In Canada, the provinces are at varying stages of development of methadone programs. There is also a glaring need for more programs in correctional facilities.

The U.S. has pioneered the use of **alternative pharmacotherapies**. Several trials have demonstrated their effectiveness under controlled conditions. In Canada, these approaches are grossly under-used.

Heroin prescription represents one of the more controversial hepatitis C prevention strategies. Several countries are exploring its use. The time appears right for a pilot trial in Canada that would be executed under strict controls.

Needle exchange programs are well established in Europe and in some parts of Canada. The opportunity exists to improve and expand them in more communities (i.e., rural) and to test their utility in prison settings. They should be part of a comprehensive program of education, counselling, supportive equipment and behaviour change.

The use of **safe injection sites** also remains controversial. Although established in several countries (e.g., Germany, Switzerland), they remain problematic in others (e.g., Australia, the U.S., Denmark). Recent experiences in Vancouver suggest that the climate may be right for controlled, experimental use of such sites in Canada.

Many countries recognize the **importance of networks, coalitions and self-help or mutual aid groups**. Australia and Holland are leaders in this regard. The foundation exists in Canada to build on current national and provincial organizations and user groups.

Drug education is highly available in some countries and strongly restricted in others. School-based programs in the U.K. and Australia hold promise. Canada has the opportunity to expand on current community-based programs to implement a wider range of informational/educational initiatives. Such activities should be seen as part of a larger hepatitis C prevention strategy and linked to ongoing resources.

In several countries, diversion programs offer a means to improve treatment and reduce the burden on the courts and prisons. Pilot programs have begun in Canada (Toronto) and the evidence warrants expansion of such programs, particularly for Aboriginal people in Canada.

A comprehensive hepatitis C prevention strategy should address the goals of reducing the uptake of, and participation in, risk behaviour; reducing incidence in the shorter term and maintaining this reduction in at-risk groups; and reducing the population incidence and prevalence of HCV infection. Key strategies must include identification of groups

in the community to be targeted for prevention activities; identification of those prevention strategies likely to be most effective; and liaison with other stakeholders in the community in establishing a prevention program.

The Australian strategy notes that interventions that have been effective in reducing transmission of HIV are not necessarily directly applicable to HCV, even in the same risk groups. With HIV, the major aim was and is to reduce risk behaviours of HIV-uninfected people (who are in the majority) so that their risk would be lower and infection would not spread. With HCV, the epidemic is established, and prevalence is high in subgroups of the population, so a major focus must be to prevent infected individuals from infecting others. AIDS education programs in place could readily be developed to include messages about HCV.

Strategies for the prevention of transmission of HCV should be broadly based, recognizing that there are many aspects to the epidemic and many lines of attack against it; they should be prioritized on the basis that the best way to prevent transmission in non-core settings (e.g., among health care workers) is to lower prevalence in the core group (injection drug users); and they should be focused according to the epidemiology of HCV. The following is a list of empirically derived strategic directions for population subgroups particularly at risk. They are drawn from the Australian (Victoria) experience and are highly consistent with U.S. and European recommendations[51].

Target Groups for Hepatitis C Prevention Strategies

Adolescents Experimenting with Drug Use and Related Risk Behaviours

Population screening for HCV infection has shown that many HCV positive patients probably became infected through sharing of needles and syringes during drug experimentation. To reduce the population prevalence of HCV infection, there is a need to greatly reduce the incidence of new infections among people starting to inject drugs.

Adolescents who are beginning experimentation with injection drug use may not have any knowledge of, or access to, needle and syringe exchange programs, nor would they identify themselves at that stage as people who inject drugs and who use such programs. For these reasons, the basic message that needs to be provided to adolescents for prevention of HCV infection is "do not inject drugs". This message could be provided to adolescents in two settings – the general community, principally through the school sector, and in juvenile correctional facilities.

The education community is well placed to deliver information and develop skills to reduce the prevalence of HCV infection in young people approaching the age of drug use experimentation or considering participation in other risk behaviours. The primary target school population is the age group 12-18 years, with an emphasis on preventing the initiation of injectable drug use. School-based education programs could be developed within a broad health framework to raise awareness and encourage use of materials designed to provide information about a number of issues: the nature of hepatitis C, including its epidemiology, transmission, and risk behaviours; a range of strategies that will help students adopt prevention options or reduce the harm associated with specific behaviours; potential behavioural, social and environmental risk factors; and appropriate sources of information, support and advice, including testing and treatment information and services.

A training program could be provided to ensure that existing service providers in the drug and sexuality areas are provided with accurate current information and strategies on hepatitis C. Where possible this training program could be incorporated into existing drug, sexuality or HIV/AIDS programs targeting the education community. Parents and the wider school community could be given current accurate information about issues

related to hepatitis C prevention education. This will ensure that consistent, accurate messages are given to young people.

Young people already at risk outside the school community will need to be reached through other campaign target groups, including youth workers, needle and syringe exchange outlets, tattooists.

Young offenders, as compared with the general adolescent population, may be at risk of transmission of blood-borne infection through higher prevalence of injection drug use, use of non-sterile equipment in tattooing and unsafe sexual behaviours. The evidence suggests a need for expansion of peer education programs both in terms of the number of young offenders who have access to them and the number of trained staff facilitators. The programs can be augmented by production and dissemination of appropriate educational materials in the form of videos, posters and pamphlets. There is a need for continued research in the area of young offender drug use and initiation into drug use to better inform practitioner intervention strategies.

People Who Currently Inject Drugs

Educational strategies should be developed for this group to prevent the spread of blood-borne viruses, and these strategies should be multifaceted. The messages should be informative rather than prescriptive, passing on the current understanding of hepatitis C and ways to avoid it, as well as management options for those already infected.

Educational strategies could build on existing programs and include peer-based education; opportunistic education in situations in which people who inject drugs are in contact with professional or other staff, for example, in drug treatment services, primary health care settings (general practitioners, accident and emergency, community health services), and correctional settings (e.g. remand or prison); targeted advertising directed at reaching "hidden" or difficult to identify groups; and a telephone counselling service around issues of prevention and referral, which could be made available to the general community.

Programs for the provision of sterile injecting equipment could be expanded. The network of needle and syringe distribution programs in some cities in Canada is extensive, but it may need to be expanded to include more after-hours service provision; provision of sterile water, alcohol swabs, and cotton wool filters.

Strategies in place to decrease the numbers of people injecting drugs should be developed further. These include the provision of substitution or treatment services, such as methadone access, and programs for people who inject heroin at an earlier stage in their injecting careers, when they are less likely to be infected with HCV.

Those in Prisons

Strategies developed to reduce the level of drug use and the prevalence of hepatitis C in the broader population will have an impact on the problems encountered in this population. However, the large number of individuals entering the penal system who inject drugs and the nature of the prison culture mean that different prevention strategies must be developed for this group. These programs must also take account of the risks involved in transitions, both in and out of prison and transfer from one facility to another.

Consideration could be given to the development of a model hepatitis C education program, building on currently available educative programs, in Canadian prisons. This might include formal orientation programs provided for every prison entrant, including counselling with regard to transmission and prevention of transmission of blood-borne viruses. In this context, every prisoner could have access to confidential testing for these viruses; formal and informal continuing education throughout the prisoner's stay, including appropriate video material and supported peer-based education; and appropriately designed and accessible posters and leaflets or pamphlets.

Positive steps could be taken to ensure that the custodial environment is conducive to reducing the impulse to use. Consideration may be given to expansion and revision of current methadone programs: issues that need to be considered include their role as part of a total rehabilitation program and not a "stand alone" chemical treatment; criteria for determining who is offered treatment and at what stage of their incarceration (e.g., maintenance of those already on programs or introduction of maintenance to select prisoners before release); and security and protection of those in the program.

Procedures that are available to reduce unsafe injecting among people who inject drugs in the general community could be available for those who inject drugs in prison settings. These include provision of supplies for cleaning injecting equipment, including anonymous provision of powdered bleach. Further consideration could also be given to whether needle and syringe exchange programs could operate in custodial settings. Unsterile tattooing occurs relatively frequently in prisons. Education about the risks of informal tattooing and methods of disinfecting equipment could be provided and bleach made available, as necessary.

Exit programs for those in custody could include provision of information about HIV, HBV and hepatitis C prevention, including information about local needle and syringe exchange programs; continuity of treatment programs from inside to outside; and information about treatment programs in the community.

Aboriginal Populations

Canadian Aboriginal people have experienced a similar fate to that of many Aboriginal people around the world. Unfortunately, poverty, illiteracy and poor health are all factors that appear to be prevalent in several Aboriginal communities. They are at greater risk of blood-borne viruses because of these factors. In Brazil, being black, having little formal education and lower family income were determinants of HCV infection[110].

A number of current studies of Australian Aboriginal communities suggest that injection drug use is increasing within these communities[111-113]. Individuals who are Aboriginal and also inject drugs have not received much information on drugs and safe using. What printed information they may have encountered does not take into account the poor literacy and numeracy levels of some Australian Aboriginals[114].

Prevention of hepatitis C and unsafe injecting practices within Aboriginal communities continues to be a high priority for research. There should be a focus on regional differences between Aboriginal people rather than an approach that treats Aboriginal people as a homogenous group[115,116].

Documentation of prevention strategies concerning hepatitis C in Aboriginal communities is difficult to find, probably because few prevention programs currently exist. It is difficult to develop prevention programs when there is little research available to provide accurate information on the magnitude of this health issue within specific target groups and the general population of Aboriginal people. Research is needed to develop best practice models[117]. This is obviously also a pressing need in Canada that needs to be addressed immediately.

A number of health promotion strategies not necessarily pertaining to hepatitis C prevention have been presented that address Aboriginal health issues. These programs do demonstrate 'lessons learned' and suggest strategies and approaches that are important for promoting success with future hepatitis C prevention programs and policies pertaining to Aboriginal people. These "lessons" focus specifically on accessing target populations, developing trust within the Aboriginal community, developing an awareness of a health issue, and educating or teaching in a manner that is culturally appropriate and empowering and that will promote the dissemination of health information to other Aboriginal people within the community.

In view of these lessons, broad-based consultation should be undertaken with Aboriginal communities, in both urban and rural settings, to ensure that they are well informed about the issues and able to plan local prevention strategies. Community-based Aboriginal organizations could be encouraged to provide information about hepatitis C prevention, screening and management; and to review and adapt, as necessary, existing models of harm reduction programs. Aboriginal community organizations should be consulted about the implementation of prevention strategies that will affect Aboriginal people, such as strategies to be implemented in prisons.

Those Whose Work Brings Them in Contact with High-Risk Groups

There are diverse groups, including health care providers, alternative health care providers, and providers of skin piercing or tattooing, who are themselves at minimal risk of HCV infection but who must maintain strict infection control procedures to prevent person-to-person transmission. In addition, others whose occupation brings them in contact with blood need to be made aware of basic infection control procedures.

Information in the form of a specific brochure could be written in conjunction with the appropriate professional organizations of each group. Professional organizations should continue to be consulted in developing appropriate infection control guidelines to prevent the spread of HCV in health care settings. Where appropriate, training could be provided to ensure that infection control procedures are understood and maintained. This could include input about HCV transmission in curricula of courses providing initial training for these professions.

Involvement of Specific Groups/Methods

Community/Referral Agencies

Those working in community and referral agencies dealing with at-risk groups are well placed to provide accurate and appropriate information about hepatitis C prevention on an opportunistic basis. It is vital that they are well-informed themselves and have the resources to carry out this role.

Agencies also need to build upon what has already been developed. Current information about hepatitis C could be included in all materials currently used in community/sporting settings for infection control for blood-borne viruses. Information updates regarding hepatitis C could be part of the ongoing professional development offered to people in these settings. Information about hepatitis C and its prevention could be included in all accredited courses for training people to work in these settings.

Consideration could be given to developing a professional training program through a designated agency, which would enable workers to gain knowledge and skills specifically for counselling people infected with HCV. A manual could be prepared targeting these agencies and containing basic information about hepatitis C, its epidemiology, prevention, testing, treatment, and discrimination issues. This manual could include an extensive up-to-date list of testing and treatment agencies. As a minimum, the manual could be distributed with appropriate training to all agencies funded by Health Canada.

The General Community

The current epidemiology of hepatitis C in Canada indicates that there is minimal risk to members of the general community through sexual transmission, vertical transmission, or household contact. The best protection for this population

lies in lowering the prevalence of HCV infection in the most affected groups. Although it is important to have a broad community strategy, this should not result in the groups most at risk being deprived of resources at the expense of those at little risk. Interventions aimed at the general public should focus on creating a climate in which prevention strategies can operate; an anti-discrimination campaign may be appropriate.

Mass Media Campaigns

If the media are used for hepatitis C prevention education it is recommended that specific groups be targeted rather than a general community mass media campaign being mounted, because it may be difficult to define a credible message that has relevance to all groups within the general community.

Conclusion

Five Key Lessons Learned from Our Review of the Evidence

Our review of the evidence with regard to the prevention of hepatitis C suggests the following five key lessons.

Lesson 1: You Cannot Out-Race the Virus

The hepatitis C virus, like other microorganisms, is capable of mutating more quickly than the rate at which we can develop effective interventions. HCV is a complex virus, and developing an effective vaccine is extremely challenging. Even if we could do this, the likelihood is that there will inevitably be another virus to take its place. For this reason, the emphasis must be on removing conditions that facilitate the spread of HCV or any other blood-borne pathogen. Removal of such conditions may result from short-term prevention efforts, such as needle exchanges, or long-term efforts, such as dealing with the underlying determinants of high-risk behaviours that lead to infection with HCV.

Lesson 2: HIV and HCV Are Different

To reduce conditions that facilitate the spread of HCV, we need specific HCV-related research. Perhaps the most important paper that we reviewed for this report was Leonard, Navarro and Pelude's review[78] of the effectiveness of harm reduction strategies as they relate to injection drug use and hepatitis C in Canada. We strongly agree with their conclusion that current efforts aimed at the prevention of blood-borne transmission are inadequate to stem HCV infection[78]. The prevalence and incidence rates of HCV infection remain high despite apparent widespread implementation of prevention strategies that appear to have been adequate to maintain a low or lower prevalence of HIV. Prevention directed selectively against HIV transmission is only partly effective in preventing HCV infection. The unique conditions that promote the spread of HCV must be addressed.

Lesson 3: Harm Reduction Is Not Enough

Our review of the available evidence suggests that harm reduction strategies provide a necessary but grossly insufficient approach to dealing with the unique conditions involved in the spread of HCV. Examination of specific strategies (e.g., methadone maintenance, needle exchange) yields equivocal evidence at best for the effectiveness of such strategies in preventing hepatitis C. Many countries are still developing their approach to dealing with hepatitis C. Most are adapting their prevention programs for HIV and injection drug use to deal with hepatitis C. Although such adaptations make intuitive and logistical sense, it is unlikely that they will be sufficient to prevent the spread of HCV. It is likely that innovative and perhaps controversial strategies will need to be developed. There needs to be an examination of the feasibility of strategies aimed at encouraging transition to non-injection forms of drug use, and high-dose methadone programs with complete cessation of injecting[78]. In view of the high prevalence of HCV infection, worldwide, among people who use injection drugs and the high degree of infectivity and transmissibility of HCV, total elimination of HCV risk-related injection behaviours may be indicated.

Lesson 4: A Tree Grows from Its Roots

The pattern of hepatitis C and associated risk behaviours clearly shows that the acquisition and spread of HCV is inherently confounded with the determinants of health. These are the roots of the problem, and they must be addressed in order to sustain a long-term solution to the problem of HCV and other health-related issues.

It is painfully evident that people living in poverty, Aboriginal people, and prison populations are at dramatically elevated risk of HCV infection because of life circumstances. For example, poverty and prison life are themselves associated with engagement in high-risk activities that increase the risk of injection drug use and therefore HCV infection. Factors that may further increase the probability of engagement in high-risk activities include a negative community environment, minority status, a negative family environment, constitutional vulnerability, early behaviour problems, adolescent problems, and other negative experiences and behaviours. In contrast, "protective" factors that reduce the risk of HCV infection include positive community and family characteristics, resilient personality and resources for coping with negative or stressful experiences.

Preventing the spread of HCV demands attention to the life conditions and life opportunities that are available to those most at risk. Unless we target the societal "roots" of injection drug use (i.e., poverty, violence, unemployment, cultural degradation, economic and social marginalization), harm reduction strategies for addressing hepatitis C will be superficially effective at best. It is only by being willing to address issues that require long-term intervention and intersectoral collaboration can the prevention of HCV and other blood-borne pathogens be effectively conducted.

Lesson 5: "Junkies" Are People Too

One first step needed to begin prevention efforts that deal with the underlying determinants of HCV infection is to address societal attitudes. Hepatitis C and injection drug use are as much social and philosophical issues as they are medical or legal ones. In Canada, as in any society, legal and medical systems are social constructions that both reflect and drive societal attitudes, beliefs and values. To adequately address hepatitis C, the attitudes that Canadians have about people living in poverty, Aboriginal people and "drug addicts" also need to be addressed. These attitudes influence what Canadians believe about drug use and related criminal activity, which in turn influence the policies and programs that will be supported by Canadians.

Evidence from the European countries suggests that any success in preventing hepatitis C (and injection drug use) will depend in part on our ability to create a collective consciousness of the problem; one that sees hepatitis C as everyone's "problem" and fosters a collaborative response on the part of the public, health service providers, governments and the legal and law enforcement systems. Riley et al. identify policy dilemmas faced by the Canadian government, which include a public perception that harm reduction does not work or, worse, that it is condoning an immoral, illegal activity. There is also the unmistakable reality that Canadian policies are understandably influenced by our proximity to the U.S. and their war on drugs – involving an approach that has been shown to be grossly ineffective in reducing hepatitis C or injection drug use and associated legal and social costs.

Further, the evidence suggests that success in dealing with hepatitis C will depend in part on helping as many people as possible to quit using injection drugs and other risky behaviours (e.g., engaging in the sex trade). It will depend on their reintegration into mainstream society through access to the prerequisites for a productive healthy life – shelter, safety, food security, meaningful social relations and economic viability.

Any success that the Europeans have had in addressing injection drug use is inherently confounded with the dramatic increase in treatment and support services that many jurisdictions have created in the past decade. At present, the available treatment and rehabilitation appear insufficient to address the hepatitis C problem in Canada. Little is known about the long-term health, social, and economic consequences of the large numbers of people who inject drugs currently infected or soon to be infected with HCV.

Summary Statement

Two of the main avenues of hepatitis C prevention efforts are (1) addressing the antecedents to drug use, and (2) facilitating healthy, productive lives for people who use drugs and for people at risk. The challenge is that factors along both avenues are complex, long term and challenging in their social, financial and political costs and logistics.

Expansion of current measures may decrease the incidence and prevalence of hepatitis C. However the public and political will in some parts of Canada appear unsure, funding shortages are pressing, and community tolerance for injection drug use may be decreasing. Measures to increase the transition from injecting to non-injecting use of drugs may be beneficial, but the strategies are uncertain. Other strategies, such as diversion programs, prescribed heroin, safe injection sites, prison-based prevention programs (including youth and Aboriginal people) and improvements in antiviral therapies are controversial or expensive, or both.

In the end, no one strategy will be adequate to prevent hepatitis C. Crofts and Wodak[58] observed that an effective HCV vaccine with an effective delivery strategy offers the best chance of long-term control. In the absence of a vaccine, there are many gaps and opportunities that need to be addressed. We argue the need for attention to three levels of prevention to address these gaps and opportunities: short-term, intermediate and long-term.

For **short-term prevention** there is the need to maintain and increase harm reduction efforts already existing. In addition, there is a need to expand treatment services to those who use injection drugs as well as to improve the quality of treatment for those already infected with HCV.

Intermediate prevention requires the development of effective rehabilitation programs, meaningful employment for marginalized individuals, strategies to decrease injection drug use, and intersectoral partnerships to work collaboratively on long-term issues. We also argue the need for education of people who use drugs about the risks of HCV infection, expansion of current prevention measures (e.g., needle exchanges), introduction of new measures (such as the promotion of non-injecting routes of administration, heroin prescription, safe injection sites), appropriate and effective treatments for chronic HCV infection among those who inject drugs, and rigorous evaluation of innovative strategies.

Long-term prevention requires a better understanding of how to influence the problems of poverty, violence, the sex trade and correctional systems. This includes the primary prevention of initiation of drug use and/or injection drug use by addressing the societal antecedents. The likelihood of controlling HCV infection is remote unless the number of people who inject drugs is reduced. Expert bodies should develop a plan to achieve this objective, including evidence-based strategies and the setting of achievable goals and targets. "Abstinence from drug use is best among the hierarchy of outcomes related to prevention of HCV infection"[58]. As John Millar, former Provincial Health Officer of B.C., said, "when it comes to hepatitis and injection drug use, you can pay now or pay later"[118].

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