

# Hepatitis C: approaching a global problem from a Canadian perspective

## Abstract

Hepatitis C is an important cause of morbidity and mortality. Because of the impact of hepatitis C on the health and economy of the population, it has become an important public health problem. It is more common among inmates of prisons and also among intravenous drug users. Prevalence of Hepatitis C is relatively more common among immigrants from countries with high endemicity and also among aboriginal populations. Although a large proportion of patients with Hepatitis C infection ultimately develop chronic hepatitis, cirrhosis of the liver, liver failure and hepatocellular carcinoma, people infected with this virus often remains asymptomatic for a long time. Early diagnosis and treatment of Hepatitis C can prevent complications and death. Introduction of highly effective antiviral drugs changed the scenario of hepatitis C infection. However, the treatment of Hepatitis C is still very expensive and the cost of anti-viral medications currently limits their use in marginalized populations who are more susceptible to this infection. There is no effective vaccine against Hepatitis C infection. As a result, public health measures - health education, counseling and harm reduction programs - remain important instruments for prevention of Hepatitis C infection in many vulnerable populations.

**Keywords:** hepatitis C Seroprevalence, anti-viral medications, intravenous drug, chronic hepatitis, hepatocellular carcinoma, blood-borne diseases, sexual transmission, anti-viral agents

Volume 4 Issue 2 - 2018

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**Received:** March 19, 2018 | **Published:** April 03, 2018

## Introduction

Hepatitis C is a global health problem. It is an important cause of mortality and morbidity all over the world.<sup>1</sup> Hepatitis C Seroprevalence increased by 2.8% in the last fifteen years and there are currently more than 185 million people infected with this virus in the world.<sup>2</sup> Approximately 75% of acute Hepatitis C infected persons cannot spontaneously clear their virus in six months and ultimately develop chronic Hepatitis C infection with long-term complications including cirrhosis of the liver and hepatocellular carcinoma.<sup>3</sup>

According to a report published by Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada,<sup>4</sup> 1% of the Canadian population is affected by Hepatitis C infection. The report also revealed that 44% of these people who were infected with Hepatitis C remained undiagnosed. This “hidden” population included people who used or currently uses injection drugs and “homeless people”.<sup>4</sup>

According to Rotermann et al.,<sup>5</sup> only 40% to 60 % among vulnerable populations (adult blood donors, men who have sex with men, prison inmates, and injection drug users) were aware of their Hepatitis C infection status. According to the authors, sexually transmitted and blood-borne infections are usually asymptomatic and as a result, infected people may remain unaware of their infection. Moreover, the level of awareness may be much lower (less than 10%) among street youth.

Hepatitis C infections in people who inject drugs often remain undiagnosed. Moreover, Hepatitis C genotypes in this population are also different from the general population. The variation and propagation of these Hepatitis C genotypes in high-risk groups may be one of the reasons for the current global epidemic. The genotypic variation among vulnerable population may also result in persistence

of Hepatitis C infection and progression to cirrhosis and hepatocellular carcinoma.<sup>6</sup>

## Prevalence of hepatitis C in Canada

Reported Hepatitis C infection rates vary across Canada. In 2008, the highest rates were found in the Yukon (84.5 per 100,000), followed by Saskatchewan (69.3 per 100,000) and B.C. (56.6 per 100,000). The lowest rates were found in Newfoundland (19.5 per 100,000) and Nunavut (6.4 per 100,000). Alberta (33.3 per 100,000) and the national average (35.5 per 100,000).<sup>7</sup>

## Transmission of hepatitis C

Hepatitis C is primarily transmitted through parenteral exposure to virus-infected blood and blood products. Sharing of injection equipment (sharing needles, syringes, filters, tourniquets, and swabs) can also cause transmission. It was reported that Hepatitis C virus can be transmitted through sharing straws and crack pipes when snorting or smoking drugs. The hypothesis is that a device shared during intranasal cocaine use, if contaminated with blood, could allow the Hepatitis C virus to enter through the damaged nasal mucosa, allowing it to enter the bloodstream. Although this hypothesis was disputed by others, intranasal use of cocaine can be a potential route of parenteral transmission of Hepatitis C.<sup>8</sup>

Other activities involving needles, such as tattooing, piercing, electrolysis, and acupuncture may pose a risk of Hepatitis C transmission if not carried out using new needles for each procedure, or if the equipment is not properly sterilized. The transmission has been reported through sharing sharp instruments or personal hygiene equipment with an infected person (e.g., toothbrushes, nail scissors and clippers, and razors). Sexual and vertical transmission of Hepatitis C is uncommon and much less efficient than with hepatitis B virus

or HIV. Risk of Hepatitis C transmission through needle stick injury is in the order of 1%–3%, compared with 30% for hepatitis B virus and 0.3% for HIV. The vertical transmission risk of Hepatitis C is approximately 4%–7%, and it rises with confections with HIV and a high maternal Hepatitis C viral load. Hepatitis C is not transmitted by breastfeeding.<sup>7,9</sup>

## Vulnerable populations

Immigrants constituted 35% of anti-Hepatitis C antibody-positive persons in Canada.<sup>4,10</sup> Population in some countries has higher prevalence rates than Canada. In these countries, certain cultural and medical practices may lead to higher risk for blood-borne diseases. People at the highest risk of the Hepatitis C infection are among the most marginalized groups in the society, such as injection drug users, prisoners and those living in endemic regions of the developing world. In parts of Asia and Africa, up to 10% of the population is infected with HCV.<sup>11</sup> The prevalence of antibodies against hepatitis C virus is as high as 15% in Egypt.<sup>12</sup> Canada has a huge burden of Hepatitis C population migrating from various regions with high endemicity for this virus.<sup>13,14</sup>

Serological evidence of Hepatitis C infection (antibody against Hepatitis C) is more common in the Canadian Inuit and First Nations (1% to 18%) than the remainder of the Canadian population (0.5% to 2%). However, viremia (presence of Hepatitis C viral RNA in the blood) is less common (less than 5% versus 75% of anti-Hepatitis C antibody positive individuals, respectively).<sup>15</sup> A study conducted between January 2004 and September 2008 among cases with known information on ethnicity showed that acute Hepatitis C infection was 5.5 times higher in Aboriginal persons than in non-aboriginal persons. The authors observed that among different factors, injection drug use (IDU) was associated with 63% of infections, drug snorting 9%, sexual contact 14%, and healthcare-acquired (transfusion of blood and blood products, haemodialysis, surgery, and dental surgery) 2%, and occupational exposure to blood, household contact with hepatitis C carriers in 8% of cases.<sup>16</sup>

Canadian data from 2008 suggested an increase in the rate of acute Hepatitis C infections among females (15–24 years) and males (25–34 years).<sup>16</sup> The researchers proposed that the increased reported rate of infection in younger females compared to their male peers might be due to earlier introduction to intravenous drug use. A social structure which might inhibit a young women's ability to negotiate safer drug use and sexual behavior may also be responsible for this situation.<sup>16</sup> Among this population discovering and implementing effective ways of preventing initiation of high-risk drug-related behaviors and preventing transmission of Hepatitis C among those who use drugs, especially among people aged 15 to 39 years, could have been an important way of dealing with this problem.<sup>16</sup>

Due to higher rates of infection among intravenous drug users, institutions and prisons share more than average burden of Hepatitis C infected population. A variety of studies on Canadian prisoners indicate rates of injection drug use between 11 percent and 24 percent, with overall drug use as high as 73 percent.<sup>17</sup> In Ontario, the prevalence rate of Hepatitis C infection among prisoners in provincial institutions was estimated to be 17 percent, and in prisoners with a history of injection drug use was estimated at 54.7 percent. The prison setting presents an opportunity to deliver Hepatitis C education, harm reduction, treatment, and care; reducing the risk of spreading the infection during incarceration and after release.<sup>18</sup> This setting also

represents an important opportunity to deliver Hepatitis C awareness messages informing the risks associated with tattooing and body piercing in prison. In this situation distribution of harm reduction materials also helped this population.<sup>19</sup>

## Difficulty in treating vulnerable populations

There were many advances in the treatment of Hepatitis C infection in the last decade which includes the introduction of highly effective oral antiviral drugs. Although these newer agents were successful in eradicating even the most difficult to treat variants of Hepatitis C virus, very high cost of these agents made them unaffordable for the people in developed as well as developing the world. Another important issue is the affectivity of antiviral agents in different vulnerable groups. The agents were not studied in marginalized populations who are disproportionately affected by Hepatitis C infection.<sup>20</sup> Health Canada has recently approved the use of this highly effective antiviral agents.<sup>21</sup> However, making these agents available to vulnerable populations including prisoners is still considered as a difficult task.<sup>22</sup>

## Prevention of hepatitis c infection in vulnerable communities

The success of hepatitis B vaccine in reducing the burden of Hepatitis B infection made many scientists interested in finding a useful vaccine for Hepatitis C. Many researchers are actively engaged in the process of invention of an effective vaccine against this deadly virus. However, due to the properties of the Hepatitis C virus, it can resist host immunity. Moreover, the virus can also modify its structure and escape host immunity making it difficult to find an effective vaccine against it.<sup>23</sup>

## The role of health education

Health education is a cost-effective intervention which can prevent the spread of Hepatitis C virus infection. Unknown infections can spread from one person to another when people from different networks and geographical locations are brought together. This is especially true about hepatitis C infection. Most of the patients are without symptoms and as a result, they are not known to be infected. This situation is allowing the spread of Hepatitis C infection in the community. This is important to understand what happens when Hepatitis C virus-infected inmates are released from the prison. They acquire the infection while in prison but the infection remains unknown to them and others. As a result, when these prisoners are released, unknowingly they spread the virus to their friends and family members and ultimately to the community. Health education and harm reduction measures are taken when the infected person is in prison and after he or she is released along with counseling of the patient and the family members can prevent spread of Hepatitis C virus infection in the community.<sup>24</sup>

## Successful implementation of hepatitis C initiative needs community engagement

After community consultations, experts from public health stressed upon the need to increase the level of knowledge about Hepatitis C prevention, treatment, and care among health care providers, other relevant stakeholders and higher risk populations as an urgent priority. There must be a system of development and delivery of educational programs focusing the cultures and customs of different ethno cultural communities. Special precautions should be taken so that the barriers

faced by different ethnocultural communities in accessing culturally relevant information about HCV prevention and other care, treatment, and support services are removed.<sup>18</sup>

## Public health measures can help reducing the burden of hepatitis C

Hepatitis C is a global health problem. Although new directly acting anti-viral agents brought good results in the treatment of Hepatitis C infection, most of these new medicines are highly expensive and therefore, remains inaccessible to many vulnerable populations. In addition, eradication of Hepatitis C will also need prevention of new infections along with the successful treatment of the people who are currently infected with this virus. The good news is, like many other infections, Hepatitis C is preventable. It usually does not spread through casual contact and unlike HIV and hepatitis B infections the risk of sexual transmission is also very low. Moreover, there are some specific risk factors associated with acute infection and this can be controlled through prevention, education, and the comprehensive distribution of safer drug-use equipment to encourage social and behavioral change.<sup>18</sup>

## Acknowledgements

Author contributed toward data analysis, drafting and revising the paper and agrees to be accountable for all aspects of the work.

## Conflict of interest

There is no conflict of interest.

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