_____ Research Report _____

The Relationship between Knowledge of HIV and HCV, Health Education, and Risk and Harm-Reducing Behaviours among Canadian Federal Inmates

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The Relationship between Knowledge of HIV and HCV, Health Education, and Risk and Harm-Reducing Behaviours among Canadian Federal Inmates

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Executive Summary

For inmates to make informed decisions about risk-behaviours, such as injection drug use and unprotected sex, they require knowledge about infectious disease transmission and prevention. Previous research suggests that greater human immunodeficiency virus (HIV) knowledge does not necessarily translate into less HIV risk-behaviours, but similar research examining the relationship between hepatitis C virus (HCV) knowledge and risk-behaviours is lacking. Moreover, past research has not extensively examined harm-reducing behaviours, such as bleaching injecting equipment, and no studies were identified which examined the association between knowledge and behaviour in the Canadian correctional context.

To address these deficiencies in the literature, in 2007 the Correctional Service of Canada (CSC) conducted the National Inmate Infectious Diseases and Risk Behaviours Survey (NIIDRBS), a self-administered paper questionnaire completed by a large sample of Canadian federal inmates (n = 3,370). This report presents NIIDRBS data on Canadian federal inmates' knowledge of HIV and HCV; the association between health education program attendance and knowledge; and, the association between knowledge and risk and harm-reducing behaviours.

Overall knowledge was higher for HIV than HCV. On average, inmates correctly answered 80% (95% CI: 79, 80) of the HIV questions compared to 69% (95% CI: 68, 70) of the HCV questions. Inmates were most knowledgeable regarding the major modes of transmission for both HIV (M = 85%, 95% CI: 84, 85) and HCV (M = 83%, 95% CI: 82, 84). For HCV, however, knowledge of transmission through casual contact (M = 62%, 95% CI: 61, 64), prevention (M = 63%, 95% CI: 62, 65), and testing and treatment (M = 60%, 95% CI: 58, 61) were lower.

The most substantial association between health education program attendance and knowledge was noted among women. Specifically, women attendees correctly answered, on average, 78% (95% CI: 77, 80) of the HCV questions compared to 68% (95% CI: 64, 71) for women non-attendees.

Contrary to previously published research, there were instances where greater knowledge was associated with safer behaviour. First, inmates aware of the HIV-risk associated with injecting drugs with needles previously used by others were less likely to report injecting drugs during the past six months in prison compared to inmates who were unaware of the risk (14% vs. 22%, $\chi^2(1, n = 2,922) = 5.84, p < 0.05$). Second, among males who injected drugs during the past six months in prison, those aware of the HCV-risk were more likely to have last injected with a needle cleaned with bleach compared to those unaware of the risk (73% vs. 46%, $\chi^2(1, n = 265) = 9.00, p < 0.05$). Third, among males ever pierced on a CSC prison range, those aware of the HCV-risk were twice as likely to report consistently using piercing equipment cleaned with bleach compared to those unaware of the risk (63% vs. 31%, $\chi^2(1, n = 306) = 8.15, p < 0.05$). Finally, among currently sexually active women, those aware of the HIV-risk were less likely to report unprotected anal sex with women during the past six months in prison compared to those who were unaware of the risk (37% vs. 71%, $\chi^2(1, n = 55) = 5.57, p < 0.05$). Further, those aware of the HCV-risk were less likely to report unprotected vaginal sex with women compared to

those unaware of the risk (67% vs. 91%, χ^2 (1, n = 59) = 5.30, $p < 0.05$). Thus, greater knowledge may not consistently reduce the occurrence of a risk-behaviour, but it may increase an inmate's tendency to use harm reduction items should he or she engage in the risk-behaviour.

The NIIDRBS provided insight into the associations between knowledge of HIV/HCV, health education, and behaviour, but the cross-sectional survey design limited rigorous evaluation of these relationships, particularly with respect to causal effects. An intervention study[1], which captures information about knowledge and behaviour over time, including after release into the community, could provide more accurate information about the impact of health education on knowledge and knowledge on behaviour. Such research should explore why inmates continue to engage in risk-behaviours, despite adequate knowledge.

[1] An investigation involving intentional change in some aspect of the status of subjects (e.g., introduction of a prevention program), or designed to test a hypothesized relationship (Last, 1995).

Table of Contents

List of Tables

List of Appendices

Introduction

For inmates to make informed decisions about risk-behaviours, such as injection drug use and unprotected sex, they require knowledge regarding how infectious diseases are transmitted and prevented. Such knowledge is particularly important in penal environments where an elevated prevalence of bloodborne and sexually transmitted infections (CIDPC, PHAC & CSC, 2008; De, Connor, Bouchard & Sutherland, 2004; Ford et al., 2000; PHAC, 2005; UNAIDS, 2006; Zou, Tepper & Giulivi, 2001) increases the risk of transmission should inmates engage in these risky behaviours. For example, studies involving Canadian federal inmates have estimated the overall seroprevalence[2] of human immunodeficiency virus (HIV) at 2% and hepatitis C virus (HCV) at 26% to 33% (De et al., 2004; Ford et al., 2000). Conversely, the prevalence of HIV is estimated at 0.3% in the Canadian adult population (15-49 years old) (UNAIDS, 2006), and the prevalence of HCV is estimated at 0.8% in the Canadian population as a whole (Zou et al., 2001).

In terms of quantifying knowledge of infectious diseases and exploring the relationships between knowledge, health education programs, and behaviour, the most frequently studied infection in incarcerated adults is HIV. Though inmate knowledge of HIV may be poor in certain countries, such as the Philippines (Simbulan, Aguilar, Flanigan & Cu-Uvin, 2001), U.S. studies suggest relatively high levels of knowledge; comparatively small increases after health education interventions; and, that women may gain more knowledge than men through health education interventions (Belenko, Shedlin, & Chaple, 2005; Bryan, Robbins, Ruiz, & O'Neill, 2006; Grinstead, Faigeles, & Zack, 1997; Ross, Harzke, Scott, McCann, & Kelley, 2006; Scott, Harzke, Mizwa, Pugh, & Ross, 2004) (see Appendix A).

In the Canadian correctional context, qualitative research conducted in 2001/2002 examined knowledge of HIV and HCV transmission among federal women inmates (Prisoners' HIV/AIDS Support Action Network, 2003). Overall, women had greater knowledge of HIV than HCV, and several knowledge deficiencies were identified for both viruses (see Appendix B). For example, 29% and 43% of the women were unaware that HIV and HCV, respectively, could be transmitted by sharing injection equipment. An earlier study involving a small sample (n = 39) of Ontario federal inmates in 1995 indicated that 100% were aware that a person can get the

[2] Prevalence based on biological testing.

acquired immune deficiency syndrome (AIDS) virus if they share unclean needles with someone who has the AIDS virus; 82% were aware that you can't get AIDS from being coughed or sneezed on by someone who has the AIDS virus; and, 82% were aware there is no cure for AIDS. The most popular sources of information reported by the inmates were mass media (97%), books or pamphlets (87%), family and friends (74%), health care providers (46%), community organizations (33%) and participation in a research study (10%) (Calzavara, Myers, Millson, Schlossberg, & Burchell, 1997).

Although health education programs can improve the infectious disease knowledge of offenders, greater knowledge may not result in safer behaviour. In a Chinese study of incarcerated female intravenous heroin users, Lee (2005) found no association between knowing that "people can get AIDS through the shared use of injection equipment" and sharing needles. Similarly, in a Greek study of randomly selected male inmates, knowledge of HIV transmission and prevention did not differ importantly between offenders who injected drugs and those who did not (Koulierakis, Power, Gnardellis, & Agrafiotis, 2003).

Further, some studies have even demonstrated greater knowledge of HIV among offenders engaged in risky behaviour. Among women offenders in an urban county jail in Texas, U.S., those reporting prostitution during the 12 months prior to incarceration had greater knowledge of HIV compared to those not reporting prostitution (Alarid & Marquart, 1999). Among Connecticut prison inmates, higher rates of needle use and needle sharing occurred among those with greater knowledge of HIV (Bryan, Robbins, Ruiz, & O'Neill, 2006). Finally, in a study of male inmates in three Louisiana State prisons, greater knowledge of HIV transmission risks was associated with an increased likelihood of injecting drugs and/or having anal sex with men (Moseley & Tewksbury, 2006). The authors hypothesized that inmates may choose to knowingly participate in high-risk behaviours because they believe the risk worthwhile or because behaviours associated with the risk are extremely difficult to change. In addition, Moseley and Tewksbury (2006) suggested that inmates may be knowledgeable about risk-behaviours as a result of engaging in them. Similarly, inmates choosing not to engage in risky behaviour may believe it is less important to be educated about the behaviour.

Thus, previous research suggests that greater HIV knowledge does not necessarily translate into less HIV risk-behaviours, but similar research examining the relationship between HCV knowledge and risk-behaviours is lacking. Moreover, past research has not extensively

examined harm-reducing behaviours, such as bleaching injecting equipment, and no studies were identified which examined the association between knowledge and behaviour in the Canadian correctional context.

To address these and other deficiencies in the literature, in 2007 the Correctional Service of Canada (CSC) conducted the National Inmate Infectious Diseases and Risk Behaviours Survey (NIIDRBS), a self-administered paper questionnaire completed by a large sample of Canadian federal inmates. This report presents NIIDRBS data on Canadian federal inmates' knowledge of HIV and HCV; the association between health education program attendance and knowledge; and, the association between knowledge and risk and harm-reducing behaviours. Such information will help inform CSC's health policy and programming decisions.

Method

Development of Survey Instrument

To obtain the data to meet the study objectives, a project team drawn from several federal government departments[3] opted to use a self-administered paper and pencil questionnaire (Zakaria, Thompson, & Borgatta, 2009) as the data collection instrument. Questionnaire development included consultations with inmates in five different penitentiaries, including a women's facility and an Aboriginal inmate group, through focus groups. To maximize comprehension, the questions did not exceed a Grade 8 literacy level. Further, inmates could choose between the English or French version of the questionnaire.

The final questionnaire was 50 pages long and took inmates approximately 45 to 55 minutes to complete. The questionnaire captured information on risk-behaviours associated with the spread of blood-borne and sexually transmitted infections; inmate testing and treatment for HIV and HCV infections; inmate knowledge of HIV and HCV; and, inmate awareness and use of health education and harm reduction programs.

Prior to data collection, Health Canada's Research Ethics Board reviewed and approved the survey methodology.

Measures

NIIDRBS sections relevant to this report include: knowledge of HIV and HCV, health education program attendance, and in-prison risk and harm-reducing behaviours.

Knowledge of HIV and HCV

The questionnaire asked inmates fourteen questions on each of HIV and HCV (see Appendices F and I for specific questions and answers). The questions covered four knowledge sub-domains: major modes of transmission, casual contact transmission, prevention, and testing and treatment. Inmates responded to each question by choosing one of "yes", "no", or "don't know". By coding a correct answer as "aware" and an incorrect or "don't know" answer as "unaware", we obtained a simple dichotomous variable called 'awareness' to facilitate analysis.

[3] CSC Research Branch, CSC Public Health Branch, and the Public Health Agency of Canada HIV/AIDS Policy, Coordination and Programs Division and Community Acquired Infections Division.

For each of HIV and HCV, overall and sub-domain scores were calculated for each inmate. The overall score was the proportion of 14 questions correctly answered. The sub-domain score was the proportion of sub-domain items correctly answered.

Health Education Program Attendance

Inmates reported whether they had participated in the following: Reception Awareness Program, Choosing Health in Prisons, The National HIV/AIDS Peer Education and Counselling Program, Circles of Knowledge Keepers, and *Chee Mamuk* (see Appendix C for a brief description of these health education programs). All of these programs provide information about infectious diseases. Response options ("yes", "no", "don't know") were used to classify inmates as "attending" or "not attending" a health education program. Inmates reporting participation ("yes") in any of these programs were classified as "attending." Inmates reporting not participating ("no") in all of these programs were classified as "not attending." All other inmates were considered to be missing this information.

In-Prison Drug, Sex, Tattooing and Piercing-Related Behaviours

Inmates reported their in-prison drug- and sex-related behaviours since November 2006 or, if admitted thereafter, since admission to prison for their current sentence. In addition, inmates reported lifetime tattooing and piercing behaviours on a CSC prison range. Drug-related behaviours included: non-injection drug use; injection drug use; and, the cleaning and sharing of needles and other injection equipment. Sex-related behaviours included: any sex (oral, vaginal, or anal); multiple sex partners; unprotected sex; using someone else's sex toy; and, having sex with a partner who has HIV, HCV, a sexually transmitted infection, or an unknown infection status. Tattooing and piercing behaviours included: sharing of tattooing equipment and/or ink; sharing of piercing equipment; and, the cleaning of tattooing and/or piercing equipment. For a detailed link between these behaviours and the NIIDRBS, see Appendix D.

Sampling

Survey Design and Sample Size Estimation

The sample frame was all inmates in federal penitentiaries, numbering approximately

13,749 just prior to the time of the survey (March, 2007). Excluded from the frame were inmates unable to understand, orally or in writing, English or French (less than 0.5% of the inmate population). Each penitentiary served as a stratum, the size of which varied from stratum to stratum. For each male penitentiary, a sample size was calculated to ensure estimated proportions had a small margin of error (±5%), 8 times out of 10 [$\alpha = 0.20$ (two-tailed), $\sigma^2 = 0.25$, finite population correction factor applied] (Cochran, 1977, p. 75). If the estimated sample size for a specific institution was 80% or more of the institution's population, the whole population of the institution was invited to participate. This occurred with small penitentiary populations so the extra survey cost was minimal. Given the small number (N = 479) of women inmates, all were invited to participate. The final sample size estimate for the entire federal population, including both men and women, was 4,981 inmates.

Institutional Sample Lists

For each male penitentiary, simple random sampling without replacement from the sample frame generated a primary list. Two or more replacement lists (secondary lists) helped maintain required sample sizes in the event an inmate refused to participate in the study or was not in the institution. Lists sorted by Aboriginal self-identification, primary official language (English or French), and aggregate sentence length facilitated substitutions. If an inmate on the primary list declined to participate or was not in the penitentiary for any reason, another inmate from the secondary list with the same characteristics could substitute for the originally sampled inmate.

Survey Implementation

Selection and Training of Survey Coordinators

Regional (Atlantic, Quebec, Ontario, Prairies, and Pacific) survey coordinators were nominated by the Assistant Deputy Commissioners for Institutional Operations. In addition, each institution's warden nominated an institutional survey coordinator. Regional coordinators acted as liaisons with institutional coordinators and held weekly teleconferences with the Research Branch to resolve logistical issues during survey implementation. The Research Branch prepared an extensive survey training manual for the coordinators and conducted face-to-face training sessions to encourage survey ownership and standardize approaches and messaging.

Promoting Awareness of the Survey

Regional Management Committees, wardens, security staff and unions were briefed regarding the survey and indicated their support. To raise awareness in institutions about the survey, a general communication and frequently asked questions were sent to all CSC employees, and posters announcing the survey were posted in all institutions (Zakaria et al., 2009). These posters emphasized the voluntary nature of the survey; guaranteed participants anonymity and confidentiality; and, reinforced that the overall purpose of the survey was to improve inmate health. Wardens also assisted by informing institutional management committees, inmate committees and local unions.

Inmate Recruitment

Institutional coordinators received lists of eligible inmates two to three weeks prior to the scheduled data collection period. Before inmates were approached, both primary and secondary lists were reviewed by an institution's Warden or his/her designate to identify security risks. Inmates deemed security risks were either excluded from further consideration or remained eligible to complete the questionnaire in their cell.

Institutional survey coordinators invited inmates on the sample list to participate in the study and to sign a consent form if they agreed (Zakaria et al., 2009). For efficiency, group information sessions were organized with eligible inmates to describe the survey and review the consent form. Consent, however, was not obtained in a group setting but privately from each inmate. Inmates in segregation were recruited individually. Educational attainment information

and experiences interacting with an inmate were used to decide whether to ask an inmate if he/she would like assistance completing the questionnaire. A small version (13.9 cm by 21.6 cm) of the survey poster was left with each inmate approached for participation (Zakaria et al., 2009).

After scheduling was complete, CSC Security reviewed the list of inmates scheduled to complete the survey in a group setting to ensure compatibility among inmates scheduled for the same group session. Thereafter, each inmate was informed of when and where they were to complete the questionnaire and were reminded the day before. Recruitment activities continued, as necessary, until the end of the data collection period for a specific institution. This allowed replacement of inmates who were unable to complete the questionnaire for any reason.

Data Collection

From May 22 to July 6, 2007, a private firm administered the questionnaire in each institution to those inmates with a signed consent form. The survey coordinator was responsible for organizing inmates for the day and time the survey contractor arrived to distribute questionnaires. Since the contractor did not have the sample list and inmates were specifically instructed not to put their name or the name of anyone else on the questionnaire, it was impossible to link the consent form with the completed questionnaire. In this manner, inmates could be assured of their anonymity and confidentiality.

Each inmate completed a self-administered questionnaire: behind a privacy screen when completed in a group setting; in his/her cell if in segregation; or through private one-on-one interviews if an inmate requested assistance. All participating inmates received the answers to the questionnaire's HIV and HCV knowledge questions after data collection was complete within their institution (Zakaria et al., 2009).

Several factors limit inmate recruitment and survey completion in the correctional environment including the transfer of inmates between institutions, the departure of inmates at warrant expiry, and inmates on conditional leave during the survey period. In total, 3,370 inmates (3,006 men, 351 women, 13 transgendered) completed a questionnaire. Operational issues limited the majority of facilities from maintaining detailed records of the total number of inmates asked to participate; however, 13 institutions, accounting for approximately 27% of the total federal inmate population at the time of the survey, provided adequate detail to estimate a survey consent and response rate. Across these 13 institutions, which included inmates residing

in minimum to maximum security levels, 1,687 inmates were asked to participate, 996 consented (consent rate = 59%) and 811 completed a questionnaire (response rate = 48%). In comparison, the 1995 National Inmate Survey reported a response rate of 64.2% [response rate = number who completed a questionnaire/(number who completed a questionnaire + number who refused)]. If inmate illnesses, releases, and transfers are included in the denominator, however, the response rate declines to 59.7% (Price Waterhouse, 1996, derived from Exhibit 1.3 on p.12). The difference in the response rates across the two surveys could be due to several factors, such as a change in the inmate profile over time or the greater sensitive content of the NIIDRBS.

The contractor retained all completed questionnaires and provided a database of anonymous survey records in August 2007. Preliminary analyses to test the integrity of the data were conducted in the fall and winter of 2007/08. The contractor destroyed all completed questionnaires in June 2008 after all data integrity issues were resolved.

General Analytical Approach

Statistical Procedures for Complex Sample Surveys

Typically, statistical procedures assume data were obtained through a simple random sample. Under such circumstances each inmate in the sample represents one inmate from the population and estimates derived from the sample relate to the population. In the NIIDRBS, inmates were randomly selected, but the sampling fraction was not consistent across institutions ranging from approximately 8% to 94%. Consequently, each inmate in the sample represented anywhere from about 1 to 13 inmates. Analyzing the NIIDRBS data as if it were obtained through simple random sampling (i.e., each inmate in the sample represents one inmate in the population) would produce incorrect population estimates and variances (Lee & Forthofer, 2006). All statistical estimates shown in this report acknowledge the NIIDRBS' complex sample design by incorporating weights that convey the number of inmates in the population represented by each inmate in the sample. The inverse of the institution's sampling fraction formed the weight for a record. Thus, estimates presented in this report relate to the Canadian federal inmate population. In addition, provision of estimated population sizes in the tables allows derivation of the number of inmates reporting a specific characteristic. Such information is of administrative value.

All analyses used SAS® 9.1 or 9.2 survey procedures (SAS Institute Inc., 2004, 2008)

that take the complex sampling design into account. Inferences to the population use common decision criteria (e.g., two-tailed alpha of 0.05). To calculate the variance of an estimate, Taylor series (linearization)[4] with the finite population correction factor. Each point estimate reported here comes with a two-sided 95% confidence interval using the Student's t-distribution. For bivariate analyses, we used the Rao-Scott chi-square test[5] for association if the data were categorical and the Wald F statistic[6] for continuous data.

Due to the large sample sizes involved in many of the comparisons, statistical significance will often occur with differences of questionable importance. To highlight differences that are both statistically significant and practically important, attention is focussed on differences exceeding 10%.

Question Non-Response and Small Subpopulations

Question non-response is a limitation of most self-report surveys that probe personal or private matters such as sexual behaviour. Although sophisticated procedures exist for addressing low response rates on certain questions, this report used an approach similar to other studies found in the survey literature: on any given question we assume that non-responders and responders share similar characteristics. Tables shown in the report note those analyses using questions where the item non-response rate varied between 20% and 50% (based on the weighted distribution) to alert the reader to this issue. Furthermore, when item non-response exceeded 50%, we chose to suppress the reporting of estimates. For reasons of confidentiality and privacy, we do not report estimates where there are fewer than five inmates sharing a characteristic. Finally, due to their small number (n = 13), results for the transgendered are not presented in this report.

Specific Analyses

Degree to which the Sample is Representative of the Population

To evaluate the extent to which the sample is representative of the inmate population, we compared sample estimates of sociodemographic and incarceration characteristics with estimates obtained from Canadian federal inmate administrative data.

[4] See SAS Institute Inc. (2004, p. 166) for details and related references.
[5] See SAS Institute Inc. (2004, p. 4216) for details and related references.
[6] See SAS Institute Inc. (2008, p. 6558) for details.

Knowledge Outcomes

To quantify knowledge, the proportion of inmates correctly answering each of the 28 questions was calculated. Average overall and sub-domain knowledge scores were also derived separately for HIV and HCV. Estimates are presented for all inmates, separately for men and women, and by Aboriginal self-identification for each gender. An examination of knowledge outcomes by gender and Aboriginal self-identification allows CSC to respond to the unique needs of women and Aboriginal inmates.

Relationship between Health Education Program Attendance and Knowledge

To assess the relationship between health education program attendance and knowledge, knowledge outcomes were compared between “attendees” and “non-attendees” separately for men and women.

Relationship between Knowledge and Behaviour

The relationship between knowledge and behaviour was assessed by comparing behaviours between inmates who were “aware” of key HIV/HCV transmission facts and inmates who were “unaware”. For example, sexual risk-behaviours were compared between inmates who knew HIV could be transmitted through oral sex and inmates who did not know.

Results

Representativeness of the Sample and Population Characteristics

Canadian federal inmate population characteristics were comparable across data sources indicating the sample was representative of the population (see Appendix E). Based on the NIIDRBS, the majority of inmates were English speaking (78%, 95% CI: 77, 79), non-Aboriginal people (79%, 95% CI: 77, 80), born in Canada (89%, 95% CI: 88, 91), who had a high school diploma or greater at the time of the survey (54%, 95% CI: 52, 56), and were not in committed relationships (69%, 95% CI: 68, 71). Gender differences existed. On average, males were older (38 versus 34 years, $F(1, 3192) = 106.64$, $p < 0.05$), had served a longer duration of their current sentence (4.8 vs. 2.2 years, $F(1, 2,975)= 274.15$, $p < 0.05$), and were less likely to be Aboriginal (21% vs. 36%, $\chi^2(1, n = 3,234) = 94.37$, $p < 0.05$) compared to women.

Human Immunodeficiency Virus (HIV)

Knowledge of HIV

On average, inmates correctly answered 80% (95% CI: 79, 80) of the HIV questions (see Table 1) and 72% (95% CI: 70, 73) of inmates correctly answered more than 75% of the questions (see Table 2).

Table 1
Average Knowledge Scores for HIV among Canadian Federal Inmates

	Men (n=3,006) (N=13,222)		**Women (n=351) (N=479)**			**All (n=3,357) (N=13,701)**	
	n	**% (95% CI)**	**n**	**% (95% CI)**	**F(1,3004)**	**n**	**% (95% CI)**
Major modes of transmission score	2,727	85 (84, 85)	322	84 (83, 86)	0.03	3,049	85 (84, 85)
Casual contact transmission score	2,727	80 (79, 82)	322	87 (86, 89)	41.62*	3,049	81 (80, 82)
Prevention score	2,727	77 (76, 78)	322	80 (79, 81)	12.93*	3,049	77 (76, 77)
Overall knowledge score	2,727	80 (79, 80)	322	83 (82, 84)	17.54*	3,049	80 (79, 80)

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Table 2
Distribution of Overall Knowledge Scores for HIV among Canadian Federal Inmates

	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)		All (n=3,357) (N=13,701)	
Percentage of inmates correctly answering…	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**
0% to 25% of questions	147	5 (4, 6)	16	5 (4, 6)	163	5 (4, 6)
>25% to 50% of questions	203	7 (6, 8)	14	4 (3, 5)	217	7 (6, 8)
>50% to 75% of questions	433	17 (15, 18)	34	11 (9, 13)	467	16 (15, 18)
>75% to 100% of questions	1,944	71 (70, 73)	258	81 (78, 83)	2,202	72 (70, 73)

Note. Distributions significantly differed by gender ($\chi^2(3, n = 3,049) = 32.06, p < 0.05$). HIV = human immunodeficiency virus; n = sample size; N = estimated population size.

Knowledge of HIV varied slightly across sub-domains, but more substantially across individual questions. With respect to sub-domains, inmates were most knowledgeable regarding the major modes of HIV transmission (M = 85%, 95% CI: 84, 85) and least knowledgeable regarding HIV prevention (M = 77%, 95% CI: 76, 77) (see Table 1). In regards to individual questions, inmates were least aware of "a female condom that can be used by women to protect themselves from getting HIV during sexual intercourse"; only 61% (95% CI: 59, 63) of inmates correctly answered this question. Conversely, inmates were most aware of the risk "of getting HIV if a person shoots up with a needle used by someone else"; 92% (95% CI: 91, 93) of inmates correctly answered this question (see Appendix F).

Additional knowledge deficiencies of concern included:

1) 25% (95% CI: 23, 26) of inmates are unaware it is "possible to get HIV from oral sex";
2) 19% (95% CI: 18, 21) of inmates are unaware that withdrawal during sexual intercourse cannot prevent HIV transmission; and,
3) 21% (95% CI: 20, 23) of inmates are unaware there is no cure for HIV.

Difference in Knowledge of HIV across Subgroups

Difference in Knowledge of HIV by Gender

Women were slightly more informed than men with respect to HIV overall, transmission through casual contact and prevention (see Table 1). The proportion of inmates correctly answering specific items significantly differed between men and women 10 times out of 14, with women generally scoring slightly higher than men (see Appendix F). There was only one item, however, where the gender differential was greater than 10%: 78% (95% CI: 75, 80) of women compared to 60% (95% CI: 58, 62) of men were aware of "a female condom that can be used by women to protect themselves from getting HIV during sexual intercourse" (χ^2 (1, n = 3,021) = 79.44, $p < 0.05$).

Difference in Knowledge of HIV by Aboriginal Self-Identification

Although some statistically significant differences existed, average overall and sub-domain HIV scores did not differ importantly by Aboriginal self-identification (see Table 3). Similarly, when comparing Aboriginal and non-Aboriginal inmates on specific questions, differences in the percentages of inmates answering correctly never exceeded 10% (see Appendix G). The largest difference existed between non-Aboriginal and Aboriginal women: 85% (95% CI: 82, 87) of non-Aboriginal women knew that Vaseline or baby oil did not augment a condom's protection against HIV compared to 75% (95% CI: 71, 79) of Aboriginal women (χ^2 (1, n = 309) = 11.14, $p < 0.05$).

Table 3

Average Knowledge Scores for HIV among Canadian Federal Inmates by Aboriginal Self-Identification

	Men					Women				
	Non-Aboriginal (n=2,281) (N=10,480)		Aboriginal (n=612) (N=2,742)			Non-Aboriginal (n=212) (N=309)		Aboriginal (n=129) (N=170)		
	n	% (95% CI)	n	% (95% CI)	F(1, 2923)	n	% (95% CI)	n	% (95% CI)	F(1, 2923)
Major modes of transmission score	2,106	85 (84, 86)	546	84 (82, 86)	0.25	197	87 (85, 88)	119	81 (78, 83)	7.79*
Casual contact transmission score	2,106	81 (79, 82)	546	80 (77, 83)	0.37	197	88 (86, 90)	119	85 (82, 87)	3.29
Prevention score	2,106	77 (76, 78)	546	74 (72, 77)	4.85*	197	82 (80, 83)	119	77 (75, 80)	5.78*
Overall knowledge score	2,106	80 (79, 81)	546	78 (76, 80)	2.66	197	84 (83, 86)	119	80 (78, 83)	6.14*

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Difference in Knowledge of HIV by Health Education Program Attendance

Forty-three percent of inmates (42% of men and 70% of women) reported attending at least one of the health education programs offered by CSC. Inmates who attended at least one health education program generally had significantly higher overall and sub-domain HIV scores compared to inmates not attending any of the health education programs (see Table 4). Differences in the average scores, however, never exceeded 10%.

Table 4

Average Knowledge Scores for HIV among Canadian Federal Inmates by Health Education Program Attendance

	Men Health Education Program Attendance					**Women Health Education Program Attendance**				
	Yes (n=1,046) (N= 5,541)		**No (n=1,426) (N=7,681)**			**Yes (n=219) (N=338)**		**No (n=86) (N=142)**		
	n	**% (95% CI)**	**n**	**% (95% CI)**	**F(1, 2598)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**F(1, 2598)**
Major modes of transmission score	1,006	88 (86, 89)	1,346	83 (82, 85)	17.19*	211	86 (84, 88)	81	85 (82, 89)	0.11
Casual contact transmission score	1,006	84 (82, 86)	1,346	78 (76, 80)	21.14*	211	91 (90, 92)	81	82 (78, 86)	12.90*
Prevention score	1,006	80 (78, 81)	1,346	75 (74, 77)	15.73*	211	83 (82, 84)	81	78 (74, 81)	5.61*
Overall knowledge score	1,006	83 (81, 84)	1,346	78 (77, 79)	24.37*	211	86 (85, 87)	81	80 (77, 84)	8.07*

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Similarly, when comparing health education program attendees and non-attendees on individual questions, statistically significant differences in favour of attendees existed for 7 of 14 items among men and 10 of 14 items among women (see Appendix H). Differences in the percentage of attendees and non-attendees correctly answering a question, however, exceeded 10% for only three items, all among women. First, 87% (95% CI: 85, 89) of women attendees knew HIV was not spread in swimming pools or hot tubs compared to 73% (95% CI: 67, 79) of non-attendees ($\chi^2(1, n = 287) = 22.46$, $p < 0.05$). Second, 96% (95% CI: 95, 97) of women attendees knew HIV was not spread through food compared to 85% (95% CI: 81, 90) of non-attendees ($\chi^2(1, n = 288) = 30.67$, $p < 0.05$). Last, 86% (95% CI: 84, 89) of women attendees knew there is no medication to cure HIV compared to 75% (95% CI: 69, 80) of non-attendees ($\chi^2(1, n = 287) = 13.16$, $p < 0.05$)

Relationship between Knowledge of HIV and Risk-Behaviours

Injecting with a Needle after Someone Else Used It

Inmates aware of the HIV-risk related to injecting drugs with needles previously used by others were less likely to report injecting drugs during the past six months in prison compared to inmates who were unaware (14% vs. 22%, $\chi 2$ (1, n = 2,922) = 5.84, $p < 0.05$). Both men and women demonstrated this pattern (see Table 5). Among men who injected drugs, however, knowledge of this risk did not significantly relate to needle sharing or cleaning during the past six months in prison. Sample sizes were too small to assess these relationships in women.

Table 5

Percent of Canadian Federal Inmates Reporting Injecting Behaviours by Knowledge of HIV Transmission through Needles

Knowledge: Is there a risk of getting HIV if a person shoots up with a needle used by someone else? [yes]										
	Men					**Women**				
Percent of inmates reporting behaviour during the past six months in prison	**Aware (n=2,480) (N=12,168)**		**Unaware (n=222) (N=1,054)**			**Aware (n=297) (N=454)**		**Unaware (n=17) (N=26)**		
	n	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**
Injection drug use	312	15 (13, 16)	40	21 (16, 27)	4.86*	36	12 (10, 14)	5	36 (22, 50)	16.32*
Among inmates who inject drugs:										
Used someone else's needle after they used it	154	57 (52, 63)	14	46 (30, 63)	1.20	14	44 (34, 53)	‡	‡	
Shared needle with HIV+/HCV+/infection status unknown person	99	40 (34, 45)	9	30 (15, 46)	0.83	9	29¶ (22, 37)	‡	‡	
Needle cleaned with bleach before last injection	163	72¶ (67, 77)	16	57¶ (39, 75)	2.04	15	64¶ (54, 74)	‡	‡¶	

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size; HCV = hepatitis C virus. ‡Suppressed because fewer than five inmates reported the characteristic. ¶Greater than 20% to 50% missing data (based on weighted distribution).

*$p < 0.05$.

Unprotected Oral Sex

Among inmates reporting sex during the past six months in prison, the proportion reporting unprotected oral sex with females was generally high for both men and women and unrelated to knowledge of the HIV-risk (see Table 6). Due to missing data, estimates related to sex with male partners are suppressed.

Table 6

Percent of Canadian Federal Inmates Reporting Sexual Behaviours by Knowledge of HIV Transmission through Oral Sex

Knowledge: Is it possible to get HIV from oral sex? [yes]										
	Men					**Women**				
Percent of inmates reporting behaviour during the past six months in prison	**Aware (n=2,035) (N=9,943)**		**Unaware (n=670) (N=3,279)**			**Aware (n=244) (N=370)**		**Unaware (n=72) (N=110)**		
	n	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**
Any sex (oral, vaginal, anal)	322	15 (14, 17)	123	18 (15, 21)	2.41	67	30 (27, 33)	19	28 (22, 34)	0.23
Among inmates having sex:										
Unprotected oral sex with women	124	72[¶] (65, 79)	§	§	-	44	91[¶] (87, 96)	12	100[¶] (-)	-

Note. Estimates of 100% have no variance. The χ^2 is not calculable with empty cells. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.

[¶]Greater than 20% to 50% missing data (based on weighted distribution). [§]Suppressed because greater than 50% missing data (based on weighted distribution).

*$p < 0.05$.

Unprotected Anal Sex

Among women reporting sex during the past six months in prison, those aware of the HIV-risk related to unprotected anal sex were less likely to engage in the behaviour with other women compared to those unaware of the risk (37% vs. 71%, $\chi^2(1, n = 55) = 5.57$, $p < 0.05$). Missing data precluded an evaluation of this relationship among men. Further, due to missing data, estimates related to sex with male partners are suppressed.

Table 7

Percent of Canadian Federal Inmates Reporting Sexual Behaviours by Knowledge of HIV Transmission through Anal Sex

Knowledge: Is there a risk of getting HIV if a person has unprotected anal sex? [yes]										
	Men					**Women**				
Percent of inmates reporting behaviour during the past six months in prison	**Aware (n=2,385) (N=11,629)**		**Unaware (n=327) (N=1,593)**			**Aware (n=271) (N=408)**		**Unaware (n=48) (N=71)**		
	n	**% (95% CI)**	**n**	**% (95% CI)**	**X^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**X^2 (1)**
Any sex (oral, vaginal, anal)	376	16 (14, 17)	66	20 (16, 25)	3.18	74	29 (26, 32)	15	35 (27, 43)	1.36
Among inmates having sex:										
Unprotected anal sex with women	78	40[¶] (33, 47)	§	§	-	17	37[¶] (29, 45)	6	71[¶] (50, 91)	5.57*

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
[¶]Greater than 20% to 50% missing data (based on weighted distribution). [§]Suppressed because greater than 50% missing data (based on weighted distribution).
*p < 0.05.

Hepatitis C Virus (HCV)

Knowledge of HCV

On average, inmates correctly answered 69% (95% CI: 68, 70) of the HCV questions (see Table 8) and 52% (95% CI: 50, 54) of inmates correctly answered more than 75% of the questions (see Table 9).

Table 8

Average Knowledge Scores for HCV among Canadian Federal Inmates

	Men (n=3,006) (N=13,222)		**Women (n=351) (N=479)**			**All (n=3,357) (N=13,701)**	
	n	**% (95% CI)**	**n**	**% (95% CI)**	**F(1,2975)**	**n**	**% (95% CI)**
Major modes of transmission score	2,702	83 (82, 84)	317	83 (82, 85)	0.14	3,019	83 (82, 84)
Casual contact transmission score	2,702	62 (61, 64)	317	74 (72, 77)	77.55*	3,019	62 (61, 64)
Prevention score	2,702	63 (62, 65)	317	67 (64, 69)	5.25*	3,019	63 (62, 65)
Testing and treatment score	2,702	59 (58, 61)	317	65 (63, 67)	17.39*	3,019	60 (58, 61)
Overall knowledge score	2,702	69 (68, 70)	317	74 (73, 76)	28.16*	3,019	69 (68, 70)

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size.
*p < 0.05.

Table 9

Distribution of Overall Knowledge Scores for HCV among Canadian Federal Inmates

	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)		All (n=3,357) (N=13,701)	
Percentage of inmates correctly answering…	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**
0% to 25% of questions	219	8 (7, 9)	20	6 (5, 8)	239	8 (7, 9)
>25% to 50% of questions	451	16 (15, 18)	33	10 (9, 12)	484	16 (15, 17)
>50% to 75% of questions	665	25 (23, 26)	58	19 (16, 21)	723	24 (23, 26)
>75% to 100% of questions	1,367	51 (49, 53)	206	65 (62, 67)	1,573	52 (50, 54)

Note. Distributions significantly differed by gender ($\chi^2(3, n = 3{,}019) = 41.68$, $p < 0.05$). HCV = hepatitis C virus; n = sample size; N = estimated population size.

Knowledge of HCV varied substantially across sub-domains (see Table 8) and individual questions (see Appendix I). With respect to sub-domains, inmates were most knowledgeable regarding the major modes of HCV transmission (M = 83%, 95% CI: 82, 84). The remaining average sub-domain scores varied little ranging from 60% (95% CI: 58, 61) for testing and treatment to 63% (95% CI: 62, 65) for prevention. In regards to individual questions, for 8 of 14 items, less than 70% of inmates correctly answered the question. Inmates were least knowledgeable regarding the fact that it is "possible, with the use of medication, to no longer be able to detect hepatitis C in a person's blood"; only 41% (95% CI: 39, 42) of inmates correctly answered this question. Conversely, inmates were most knowledgeable about the HCV-risk associated with "tattooing or piercing" and injecting with "a needle used by someone else"; 91% of inmates (95% CI: 90, 92) correctly answered these questions.

Additional knowledge deficiencies of concern include:

1) 32% (95% CI: 30, 33) of inmates are unaware that it is possible to get HCV by borrowing straws and/or crack pipes to snort or smoke cocaine;
2) 47% (95% CI: 45, 49) of inmates are unaware there is no vaccine for HCV;
3) 25% (95% CI: 24, 27) of inmates are unaware that antibiotics do not protect against HCV; and,
4) 38% (95% CI: 36, 40) of inmates are unaware that it is possible to get re-infected with HCV after successful treatment.

Difference in Knowledge of HCV across Subgroups

Difference in Knowledge of HCV by Gender

Compared to men, women had slightly higher average scores for overall HCV knowledge and the sub-domains of prevention and testing and treatment (see Table 8). Men and women differed, however, to a greater degree on the casual contact transmission score; on average, women correctly answered 74% (95% CI: 72, 77) of these questions compared to 62% (95% CI: 61, 64) for the men ($F(1, 2975) = 77.55$, $p < 0.05$).

The proportion of inmates correctly answering specific questions significantly differed between men and women for 10 of the 14 items. For each of the ten items, women consistently scored higher than men (see Appendix I). There were only three items, however, where the gender differential was greater than 10%. All three items asked about transmission through casual contact:

1) 79% (95% CI: 77, 82) of women knew HCV is not spread through food compared to 66% (95% CI: 64, 68) of men ($\chi^2(1, n = 2989) = 45.58$, $p < 0.05$);
2) 79% (95% CI: 77, 82) of women knew HCV is not spread through coughing or sneezing compared to 65% (95% CI: 63, 67) of men ($\chi^2(1, n = 2986) = 50.33$, $p < 0.05$); and,
3) 73% (95% CI: 70, 75) of women knew HCV is not spread by sharing drinks compared to 52% (95% CI: 50, 54) of men ($\chi^2(1, n = 2987) = 93.35$, $p < 0.05$).

Difference in Knowledge of HCV by Aboriginal Self-Identification

Although some statistically significant differences in average overall and sub-domain scores existed by Aboriginal self-identification, differences never exceeded 10% (see Table 10). Similarly, when comparing Aboriginal and non-Aboriginal inmates on specific questions, significant differences in the percentage of inmates correctly answering a question exceeded 10% on one item (see Appendix J): 62% (95% CI: 59, 66) of non-Aboriginal women were aware there was no vaccine for HCV compared to 50% (95% CI: 45, 54) of Aboriginal women ($\chi^2(1, n = 307) = 12.58$, $p < 0.05$).

Table 10
Average Knowledge Scores for HCV among Canadian Federal Inmates by Aboriginal Self-Identification

	Men					Women				
	Non-Aboriginal (n=2,281) (N=10,480)		Aboriginal (n=612) (N=2,742)			Non-Aboriginal (n=212) (N=309)		Aboriginal (n=129) (N=170)		
	n	% (95% CI)	n	% (95% CI)	F(1, 2892)	n	% (95% CI)	n	% (95% CI)	F(1, 2892)
Major modes of transmission score	2,084	83 (82, 84)	541	83 (81, 86)	0.04	194	85 (83, 87)	117	81 (78, 83)	5.12*
Casual contact transmission score	2,084	62 (60, 63)	541	64 (61, 68)	1.93	194	76 (73, 78)	117	71 (68, 75)	3.06
Prevention score	2,084	64 (63, 66)	541	59 (56, 63)	6.98*	194	70 (67, 74)	117	61 (58, 65)	11.27*
Testing and treatment score	2,084	59 (58, 61)	541	61 (58, 64)	0.87	194	66 (64, 69)	117	63 (60, 66)	1.78
Overall knowledge score	2,084	69 (68, 70)	541	70 (67, 72)	0.12	194	76 (74, 78)	117	71 (69, 74)	6.55*

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Difference in Knowledge of HCV by Health Education Program Attendance

Inmates who attended at least one health education program had significantly higher overall and sub-domain scores compared to inmates not attending any of the health education programs, but gender differences existed (see Table 11). Among men, none of the statistically significant differences between program attendees and non-attendees exceeded 10%, while for women three out of five did:

1) women attendees correctly answered, on average, 79% (95% CI: 76, 81) of the "transmission through casual contact" questions compared to 65% (95% CI: 61, 70) for women non-attendees ($F(1, 2569) = 17.02$, $p < 0.05$);
2) women attendees correctly answered, on average, 72% (95% CI: 70, 75) of the "prevention" questions compared to 57% (95% CI: 52, 63) for women non-attendees ($F(1, 2569) = 17.23$, $p < 0.05$); and,
3) women attendees correctly answered, on average, 69% (95% CI: 66, 71) of the "testing and treatment" questions compared to 58% (95% CI: 54, 63) for women non-attendees ($F(1, 2569) = 11.35$, $p < 0.05$).

Table 11

Average Knowledge Scores for HCV among Canadian Federal Inmates by Health Education Program Attendance

	Men Health Education Program Attendance					Women Health Education Program Attendance				
	Yes (n=1,046) (N=5,541)		No (n=1,426) (N=7,681)			Yes (n=219) (N=338)		No (n=86) (N=142)		
	n	% (95% CI)	n	% (95% CI)	F(1, 2569)	n	% (95% CI)	n	% (95% CI)	F(1, 2569)
Major Modes of Transmission Score	996	86 (85, 88)	1,331	81 (80, 83)	20.96*	208	87 (85, 88)	80	79 (75, 83)	8.49*
Casual Contact Transmission Score	996	67 (65, 69)	1,331	61 (59, 63)	13.73*	208	79 (76, 81)	80	65 (61, 70)	17.02*
Prevention Score	996	67 (64, 69)	1,331	62 (60, 65)	6.94*	208	72 (70, 75)	80	57 (52, 63)	17.23*
Testing and Treatment Score	996	64 (62, 64)	1,331	58 (56, 60)	13.19*	208	69 (66, 71)	80	58 (54, 63)	11.35*
Overall Knowledge Score	996	73 (72, 75)	1,331	68 (66, 69)	23.41*	208	78 (77, 80)	80	68 (64, 71)	19.59*

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Similarly, when comparing health education program attendees and non-attendees on specific questions, statistically significant differences in favour of attendees existed for 10 of 14 items for both men and women (see Appendix K). Differences in the percentage of attendees and non-attendees correctly answering a question, however, never exceeded 10% among men. Conversely, among women, differences in the percentage of attendees and non-attendees correctly answering a question exceeded 10% for seven items. The largest percentage difference occurred for the question: "Is hepatitis C spread in hot tubs and swimming pools?" Seventy-nine percent (95% CI: 76, 82) of women attendees correctly answered this question compared to 60% (95% CI: 53, 66) of women non-attendees ($\chi^2(1, n = 280) = 25.34, p < 0.05$).

Relationship between Knowledge of HCV and Risk-Behaviours

Injecting with a Needle after Someone Else Used It

Consistent with the previously identified association between knowledge of HIV and injecting drugs (see Table 5), the proportion of males injecting over the past six months in prison was smaller among those aware of the HCV-risk compared to those unaware of the risk (15% vs. 20%). The difference, however, was not statistically significant using a two-tailed test ($\chi^2(1, n = 2,596) = 2.76, p = 0.0968$) (see Table 12).

Among men who injected drugs during the past six months in prison, risk awareness was

significantly associated with injecting behaviour. Fifty-nine percent (95% CI: 53, 64) of those aware of the risk actually used another's needle compared to 36% (95% CI: 22, 50) of those unaware of the risk ($\chi^2(1, n = 329) = 5.95, p < 0.05$). Further, 42% (95% CI: 37, 48) of those aware of the risk shared a needle with someone who was HIV-positive, HCV-positive, or of unknown infection status compared to 14% (95% CI: 4, 24) of those unaware of the risk ($\chi^2(1, n = 304) = 9.76, p < 0.05$). On the other hand, 73% (95% CI: 67, 78) of those aware of the risk last injected with a needle cleaned with bleach compared to 46% (95% CI: 31, 61) of those unaware of the risk ($\chi^2(1, n = 265) = 9.00, p < 0.05$). Hence, those aware of the risk were more likely to share needles, but they were also more likely to clean their needles with bleach. Small sample sizes precluded assessment of these relationships among women.

Table 12

Percent of Canadian Federal Inmates Reporting Injecting Behaviour by Knowledge of HCV Transmission through Needles

Knowledge: Is there a risk of getting hepatitis C if a person injects with a needle used by someone else? [yes]										
	Men					**Women**				
	Aware (n=2,430) (N=12,021)		**Unaware (n=256) (N=1,201)**			**Aware (n=281) (N=433)**		**Unaware (n=30) (N=46)**		
Percent of inmates reporting behaviour during the past six months in prison	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**
Injection drug use	311	15 (13, 16)	45	20 (15, 24)	2.76	37	13 (11, 15)	‡	‡	-
Among inmates who inject drugs:										
Used someone else's needle after they used it	155	59 (53, 64)	14	36 (22, 50)	5.95*	14	42 (33, 51)	‡	‡	-
Shared needle with HIV+/HCV+/infection status unknown person	105	42 (37, 48)	5	14 (4, 24)	9.76*	9	28¶ (21, 35)	‡	‡	-
Needle cleaned with bleach before last injection	163	73¶ (67, 78)	16	46¶ (31, 61)	9.00*	15	62¶ (52, 72)	‡¶	‡	-

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size; HIV = human immunodeficiency virus.
‡Suppressed because fewer than five inmates reported the characteristic. ¶Greater than 20% to 50% missing data (based on weighted distribution).
*p < 0.05.

Tattooing and Piercing

The proportion of inmates ever tattooed on a CSC prison range did not differ between those aware and unaware of the HCV-risk (39% vs. 35%, $\chi^2(1, n = 2{,}888) = 0.73$, $p > 0.05$) (see Table 13 for gender-specific estimates). Further, among those ever tattooed on a CSC prison range, the proportion reporting consistent cleaning of tattoo equipment with bleach did not differ between those aware and unaware of the HCV-risk (67% vs. 67%, $\chi^2(1, n = 1{,}050) = 0.00$, $p > 0.05$).

Similarly, the proportion of men ever pierced on a CSC prison range did not differ between those aware and unaware of the HCV-risk (13% vs. 14%, $\chi^2(1, n = 2{,}574) = 0.03$, $p > 0.05$) (see Table 13). Among men ever pierced on a CSC prison range, however, the proportion consistently using piercing equipment cleaned with bleach was twice as high for those aware of the HCV-risk compared to those unaware (63% vs. 31%, $\chi^2(1, n = 306) = 8.15$, $p < 0.05$). Small sample sizes prevented an assessment of these relationships among women.

Table 13

Percent of Canadian Federal Inmates Reporting Tattooing/Piercing Behaviours by Knowledge of HCV Risk

Knowledge: Is there a risk of getting infected with hepatitis C while getting a tattoo or piercing? [yes]										
	Men					**Women**				
	Aware (n=2,447) (N=12,069)		**Unaware (n=241) (N=1,153)**			**Aware (n=287) (N=437)**		**Unaware (n=27) (N=42)**		
Percent of inmates reporting behaviour ever	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**
Tattooed on CSC prison range	890	39 (37, 41)	82	35 (29, 41)	0.90	110	39 (36, 42)	11	51 (39, 62)	2.74
Among inmates tattooed on CSC prison range:										
Tattooing equipment cleaned with bleach each use	578	67 (64, 70)	50	67 (57, 77)	0.00	79	72 (67, 77)	7	69 (51, 86)	0.13
Pierced on CSC prison range	294	13 (12, 15)	31	14 (9, 18)	0.03	27	10 (8, 11)	‡	‡	-
Among inmates pierced on CSC prison range:										
Piercing equipment cleaned with bleach each use	175	63 (57, 68)	10	31 (14, 48)	8.15*	16	62 (53, 72)	‡	‡	-

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size; CSC = Correctional Service Canada.
‡Suppressed because fewer than five inmates reported the characteristic.
*$p < 0.05$.

Unprotected Vaginal Sex

The proportion of inmates reporting sex during the past six months in prison did not differ between those aware and unaware of the HCV-risk associated with unprotected sexual intercourse (17% vs. 17%, $\chi^2(1, n = 2{,}881) = 0.05$, $p > 0.05$) (see Table 17 for gender-specific estimates). Further, the majority of sexually active inmates reported unprotected vaginal sex with women. Among sexually active women, however, the proportion reporting unprotected vaginal sex with female partners was significantly lower among those aware of the HCV-risk compared to those unaware of the risk (67% vs. 91%, $\chi^2(1, n = 59) = 5.30$, $p < 0.05$). This was not the case among sexually active men (72% vs. 83%, $\chi^2(1, n = 254) = 2.19$, $p > 0.05$). Thus, among women, knowledge of HCV transmission through unprotected sexual intercourse was associated with less unprotected sex. Due to missing data, estimates related to sex with male partners are suppressed.

Table 14

Percent of Canadian Federal Inmates Reporting Sexual Behaviours by Knowledge of HCV Transmission through Sex

Knowledge: Is it possible for a person to get hepatitis C if they have unprotected sexual intercourse? [yes]										
	Men					**Women**				
	Aware (n=2,157) (N=10,523)		**Unaware (n=534) (N=2,699)**			**Aware (n=248) (N=381)**		**Unaware (n=65) (N=99)**		
Percent of inmates reporting behaviour during the past six months in prison	**N**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**χ^2 (1)**
Any sex (oral, vaginal, anal)	356	16 (15, 18)	86	17 (13, 20)	0.07	70	31 (27, 34)	17	28 (22, 34)	0.40
Among inmates having sex:										
Unprotected vaginal sex with women	146	72¶ (66, 78)	40	83¶ (73, 93)	2.19	31	67¶ (58, 75)	12	91¶ (81, 100)	5.30*

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size.
¶Greater than 20% to 50% missing data (based on weighted distribution).
*$p < 0.05$.

Discussion

Overall, inmates correctly answered, on average, about 11 of 14 HIV questions and 10 of 14 HCV questions. Although knowledge deficiencies were identified for some key HIV/HCV facts, these deficiencies may not be much greater than that found in the general population (see Appendix L). A 2006 community-based telephone survey conducted in Canadians older than 15 years found that approximately 11% were unaware that HIV/AIDS could not be cured. Among Aboriginal peoples, this proportion reached as high as 26% in the Inuit sub-population (EKOS Research Associates, 2006a, 2006b). Our research indicated that 21% (95% CI: 20, 23) of inmates were unaware there is no cure for HIV and this proportion was 24% (95% CI: 21, 28) for Aboriginal males and 19% (95% CI: 15, 22) for Aboriginal females. Furthermore, comparisons with past research involving federal women inmates suggest knowledge of transmission of HIV and HCV may have increased over time. For example, in 2001/02, approximately 54% of women were aware that HCV could be transmitted through tattooing and body piercing (Prisoners' HIV/AIDS Support Action Network, 2003) whereas the NIIDRBS indicated that 91% (95% CI: 89, 93) of women were aware of this mode of transmission.

The Relationships between Gender, Aboriginal Self-Identification, Health Education Program Attendance and Knowledge

For both HIV and HCV, women were slightly more knowledgeable than men (see Tables 1 and 8), and non-Aboriginal inmates were slightly more knowledgeable than Aboriginal inmates (see Tables 3 and 10), but the importance of such small absolute differences is questionable. More substantial differences in HCV knowledge, however, existed across knowledge sub-domains (see Table 8) and, among women, by health education program attendance (see Table 11 and Appendix K). With respect to sub-domains, knowledge of HCV transmission through casual contact, prevention, and testing and treatment was lower than knowledge of the major modes of transmission. In regards to health education programs, women attendees scored significantly higher than women non-attendees for 10 of the 14 HCV questions. Furthermore, for 7 of these 10 questions, the proportion of women attendees correctly answering was more than 10% greater than women non-attendees. The greater knowledge differences between health education program attendees and non-attendees observed among women compared to men are

consistent with previously published work. Bryan, Robbins, Ruiz, & O'Neill (2006) found women gained significantly more knowledge than men during a prison-based HIV prevention intervention.

These findings suggest that health education programs may be more effective for women than men and that HCV knowledge is lacking, particularly in areas other than the major modes of transmission.

The Relationships between Knowledge and Behaviour

Contrary to previously cited research (Alarid & Marquart, 1999; Bryan, Robbins, Ruiz, & O'Neill, 2006; Koulierakis et al., 2003; Lee 2005; Moseley & Tewksbury, 2006), there were instances where greater knowledge was associated with safer behaviour. First, inmates aware of the HIV-risk associated with injecting drugs with needles previously used by others were less likely to report injecting drugs during the past six months in prison compared to inmates who were unaware of the risk (14% vs. 22%, $\chi^2(1, n = 2,922) = 5.84, p < 0.05$). Second, among males who injected drugs during the past six months in prison, those aware of the HCV-risk were more likely to have last injected with a needle cleaned with bleach compared to those unaware of the risk (73% vs. 46%, $\chi^2(1, n = 265) = 9.00, p < 0.05$) (see Table 12). Third, among males ever pierced on a CSC prison range, those aware of the HCV-risk were twice as likely to report consistently using piercing equipment cleaned with bleach compared to those unaware of the risk (63% vs. 31%, $\chi^2(1, n = 306) = 8.15, p < 0.05$) (see Table 13). Finally, among currently sexually active women, those aware of the HIV-risk were less likely to report unprotected anal sex with women during the past six months in prison compared to those who were unaware of the risk (37% vs. 71%, $\chi^2(1, n = 55) = 5.57, p < 0.05$) (see Table 7). Further, those aware of the HCV-risk were less likely to report unprotected vaginal sex with women compared to those unaware of the risk (67% vs. 91%, $\chi^2(1, n = 59) = 5.30, p < 0.05$) (see Table 14). Unprotected sex has varying degrees of risk depending on the method of penetration. For example, unprotected anal sex is a higher risk activity when it involves penile penetration or shared sex toys rather than fingering or fisting, and unprotected vaginal sex is a higher risk activity when it involves penile penetration or fisting rather than fingering (Canadian AIDS Society, 2004). Unfortunately, information regarding the method of penetration was not captured. Further, missing data precluded an evaluation of these knowledge-behaviour relationships among inmates reporting

sex with male partners.

Thus, greater knowledge may not consistently reduce the occurrence of a risk-behaviour, but it may increase an inmate's tendency to use harm reduction items should he or she engage in the risk-behaviour. Further research, however, is needed to validate these findings, and quantify the knowledge-behaviour relationship after adjusting for other potentially important factors (e.g., severity of drug addiction, availability of harm reduction items, sentence length, infection status, etc.).

Knowledge Comparisons across HIV and HCV

Although the average overall knowledge score was higher for HIV (80%, 95% CI: 79, 80) than HCV (69%, 95% CI: 68, 70), differences in the questions across pathogens limit a direct comparison of these scores. Seven of the 14 questions, however, were similar enough across pathogens for direct comparisons (see Appendix M). For one of the seven items, knowledge was comparable: at least 90% of men and women knew sharing needles can transmit HIV and HCV. For the remaining six items, the HIV-HCV knowledge differential was evident for both men and women. These six items covered transmission through casual contact (4 items), the use of antibiotics for prevention (1 item), and the presence of a cure (1 item).

With respect to those items examining knowledge of transmission through casual contact, inmates correctly answered, on average, 81% (95% CI: 80, 82) of these questions in reference to HIV compared to 62% (95% CI: 61, 64) in reference to HCV (see Tables 1 and 8). In regards to the use of antibiotics for prevention, 86% (95% CI: 84, 87) of inmates knew antibiotics were not protective against HIV compared to 75% (96% CI: 73, 76) for HCV. Finally, with respect to knowledge of a cure, 79% (95% CI: 77, 80) of inmates were aware there was no cure for HIV. In comparison, only 41% (95% CI: 39, 42) of inmates were aware that HCV could be cured with medication.

As a consequence of these knowledge deficiencies for HCV, inmates may fear discrimination because of their infection status; inmates on antibiotics may behave riskier under a false sense of security; and, testing uptake may not be optimal because of lack of awareness of a cure. This HIV-HCV knowledge differential, which has been previously noted among federal women inmates (Prisoners' HIV/AIDS Support Action Network, 2003), may reflect a greater emphasis on HIV in both federal prison and the community.

Limitations and Recommendations for Future Research

The NIIDRBS has several limitations. First, although it provided some insight into the associations between knowledge, health education, and behaviour, its cross-sectional design limited rigorous evaluation of these relationships, particularly with respect to causal effects. Second, since the NIIDRBS did not inquire about all possible information sources (e.g., television, educational pamphlets, health services interactions, etc.), it was not possible to quantify the knowledge gained specifically through health education program participation. Finally, inmates may have been unaware of the names of the various health education programs leading to their misclassification as "non-attendees". Such misclassification could lead to an underestimation of the impact of health education programs.

To address these limitations, an intervention study, which captures knowledge and behaviour before and after health education program attendance, could provide more accurate information about the impact of health education on knowledge and knowledge on behaviour. Such research should collect and adjust for other potentially important factors (e.g., severity of drug addiction, availability of harm-reduction programs/items, additional sources of knowledge, etc.) in the analyses. This would provide a more valid quantification of the knowledge-behaviour relationship. Finally, information about why inmates continue to engage in risk-behaviours, despite adequate knowledge, would be useful.

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Appendices

Appendix A: American Studies Examining the Knowledge of HIV and the Impact of Health Education Programs Among Offenders

Study	State & Sample Size	Pre-Intervention Knowledge Score	Intervention/Education Program	Post-Intervention Knowledge Score
Ross, Harzke, Scott, McCann, & Kelley (2006)	Texas n=257 (217 males, 40 females) inmate peer educators n=2,506 inmate students	Average percent correct for inmate peer educators=80%. Average percent correct for inmate students not provided.	40 hours of training for peer educators. HIV education sessions delivered by peer educators to other inmates. Annual regional conferences to update peer educators.	Average percent correct for inmate peer educators=90%. Average percent correct for inmate students not provided. Pre-intervention, significant differences in HIV-related knowledge existed across categories of prior education level and race/ethnicity for the peer educators and inmate students, but most of these differences disappeared post-intervention.
Bryan, Robbins, Ruiz, & O'Neill (2006)	Connecticut n=196 (176 males, 20 females)	Average percent correct=79%.	Six education sessions (each lasting 90 minutes and occurring once weekly).	Average percent correct=89%. Women appeared to gain more knowledge than men from the intervention.

Study	State & Sample Size	Pre-Intervention Knowledge Score	Intervention/Education Program	Post-Intervention Knowledge Score
Belenko, Shedlin, & Chaple (2005)	New York n=300 (210 males, 90 females)	Average percent correct=84%. Knowledge scores consistent across criminal justice settings (i.e., inmates, parolees, and probationers). Knowledge scores were consistent across ethnicity (African American, Hispanic, non-Hispanic white/other). Average sub-scale scores were also high ranging from 80% for the maternal transmission subscale to 93% for the general knowledge subscale.	Not applicable.	Not applicable.
Scott, Harzke, Mizwa, Pugh, & Ross (2004)	Texas n=242 (138 males, 104 females)	Average percent correct=79%.	Inmates selected as peer educators received 40 hours of training regarding HIV/STD. Peer educators, in turn, provided approximately 12 hours of HIV/STD peer education.	Average percent correct=87%.
Grinstead, Faigeles, & Zack (1997)	California n=2,295 (all males)	Average percent correct=78%.	60 to 90 minutes of HIV prevention education provided in a group environment by a professional educator or HIV-positive peer educator.	Average percent correct=83% (professional educator). Average percent correct=81% (HIV-positive peer educator).

Note. All pre-post comparisons were reported as statistically significant at an alpha=0.05. HIV = human immunodeficiency virus.

Appendix B: Knowledge of Transmission of HIV and HCV Among Canadian Federal Women Inmates in 2001/2002

Knowledge of Transmission…	Percentage Aware (n = 118)	
	HIV	HCV
Sexually from a man to a woman	78	53
Through sharing of injection equipment	71	57
Through tattooing and body piercing	67	54
Sexually from woman to woman	54	45
From sharing sharps for slashing or self-injury	35	32
Through snorting cocaine or smoking crack	25	27

Note. Data was collected using qualitative one-on-one interview methods in 9 of the 11 Canadian facilities housing federal women prisoners in 2001/02 (Prisoners' HIV/AIDS Support Action Network, 2003).

Appendix C: Description of Health Education Progams

Reception Awareness Program

The Reception Awareness Program (RAP) is offered to inmates in CSC reception institutions and in all women's institutions. RAP provides information on infectious diseases, harm-reduction measures, substance abuse treatment programs, infectious disease testing and treatment, and health services offered in all CSC institutions. As with all health education programs, participation is voluntary.

Choosing Health in Prisons Program

This program includes information about healthy living, nutrition, stress, and infectious diseases. It is not available in all penitentiaries. As with all health education programs, participation is voluntary.

The National HIV/AIDS Peer Education and Counselling Program

The National HIV/AIDS Peer Education and Counselling (PEC) Program trains selected inmates to become peer educators to provide information and support to other inmates, primarily around infectious diseases. PEC contains information on infectious diseases, healthy living, stress, addictions, and harm-reduction.

There is a women's component of PEC which provides women-specific information. Similar programs exist for Aboriginal inmates. Chee Mamuk is delivered in the Pacific Region as it is geared towards Pacific First Nations peoples. Circles of Knowledge Keepers is delivered in all CSC regions. As with all health education programs, participation is voluntary.

Note. HIV = human immunodeficiency virus; AIDS = acquired immunodeficiency syndrome.

Appendix D: Risk-Behaviours Captured by the NIIDRBS

Risk-Behaviours	NIIDRBS Questions
Drug-Related Risk-Behaviours since Nov 2006	
Non-injection drug use	Q47
Injection drug use	Q32
Last injecting with a needle cleaned with bleach	Q37, Q37a
Using someone else's needle after they used it	Q36
Sharing a needle with someone who has HIV, HCV, or an unknown infection status	Q39
Using someone else's works[a] after they used it	Q44
Sharing works with someone who has HIV, HCV, or an unknown infection status	Q46
Sexual Risk-Behaviours since Nov 2006	
Any sex (oral, vaginal, or anal)	Q55
Sex with multiple partners	Q55a
Unprotected sex	Q56, Q57, Q59, Q60, Q63
Using someone else's sex toy after they used it	Q58
Having sex with a partner who has HIV, HCV, an STI, or an unknown infection status	Q61
Lifetime Tattooing Risk-Behaviours on a CSC Prison Range	
Ever tattooed on a CSC prison range	Q24, Q24a
Using someone else's ink and/or tattoo equipment	Q24b, Q24e
Consistent tattoo equipment cleaning with bleach	Q24f, Q24g
Lifetime Piercing Risk-Behaviours on a CSC Prison Range	
Ever pierced on a CSC prison range	Q25, Q25a
Using someone else's piercing equipment	Q25b
Consistent piercing equipment cleaning with bleach	Q25d, Q25e

Note. NIIDRBS = National Inmate Infectious Diseases and Risk-Behaviours Survey; HIV = human immunodeficiency virus; HCV = hepatitis C virus; STI = sexually transmitted infection.
[a]Works include water, filter, and cooker/spoon.

Appendix E: Canadian Federal Inmate Characteristics by Data Source

Characteristics	NIIDRBS (n=3,357) (N=13,701)					CSC Administrative Data (N=13,041)			
	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)		X^2(df) or $F(v_1,v_2)$	Men (N=12,574)		Women (N=467)	
	n	Mean or % (95% CI)	n	Mean or % (95% CI)		N	Mean or %	N	Mean or %
Age (years)	2,899	38 (38, 39)	335	34 (34, 35)	106.64* (1,3192)	12,554	38	466	35
Highest level of education at time of survey (%)									
Less than highschool diploma	1,252	46 (44, 48)	156	48 (45, 51)	0.68	-	-	-	-
Highschool diploma or greater	1,533	54 (52, 56)	176	52 (49, 55)	(1)	-	-	-	-
Marital status (%)									
Married/common law	884	31 (29, 32)	121	35 (32, 38)	4.90*	4,839	39	165	36
Single/separated/divorced/widowed	2,043	69 (68, 71)	224	65 (62, 68)	(1)	7,654	61	297	64
Country of birth (%)									
Canada	2,622	89 (88, 90)	320	92 (91, 94)	5.87*	11,175	89	412	89
Other	305	11 (10, 12)	26	8 (6, 9)	(1)	1,386	11	53	11
Aboriginal self-identification (%)									
Aboriginal	612	21 (19, 22)	129	36 (33, 38)	94.37*	2,466	20	147	32
Non-Aboriginal	2,281	79 (78, 81)	212	65 (62, 67)	(1)	10,023	80	310	68
Race (%)									
White/caucasian	1,852	65 (63, 67)	179	55 (52, 58)	82.52*	8,482	68	258	56
Aboriginal	612	21 (20, 23)	129	36 (34, 38)	(2)	2,466	20	147	32
Other visible minority	356	14 (13, 15)	28	9 (7, 11)		1,541	12	52	11
Language most comfortable speaking (%)									
English	2,154	78 (77, 79)	302	84 (83, 86)	32.90*	8,425	74	317	79
French	719	20 (20, 21)	37	14 (13, 15)	(2)	2,342	21	62	15
Other	54	2 (1, 2)	6	2 (1, 2)		642	6	22	5
Years served of present sentence	2,702	4.8 (4.6, 5.1)	318	2.2 (2.0, 2.4)	274.15* (1, 2975)	12,554	4.4	466	3.0
Region (%)									
Atlantic	317	10 (10, 10)	50	13 (13, 13)	-	1,297	10	62	13
Quebec	868	24 (24, 24)	42	16 (16, 16)		2,990	24	73	16
Ontario	627	27 (27, 27)	84	26 (26, 26)		3,344	27	123	26
Prairie	847	25 (25, 25)	137	33 (33, 33)		3,168	25	151	32
Pacific	347	15 (14, 15)	38	13 (12, 13)		1,772	14	58	12
Security level (%)									
Maximum	581	21 (21, 21)	0		-	3,199	25	102	22
Medium	1,488	60 (60, 60)	0			6,934	55	196	42
Minimum	869	18 (18, 18)	4	1 (1, 1)		1,907	15	161	34
Unknown	68	1 (1, 1)	347	99 (99, 99)		534	4	8	2

Note. Percentages may not add to 100 due to rounding. Education level derived from administrative data is not comparable to NIIDRBS estimates because of inconsistency in method of capture (i.e., standardized testing at admission versus self-report at time of survey). Since NIIDRBS security level is based on institutional security level, it is unknown for the majority of women inmates who reside in multi-level security institutions. The chi-square test was not calculable for region because of lack of stratum variance. NIIDRBS = 2007 National Inmate Infectious Diseases & Risk-Behaviours Survey; CSC = Correctional Service Canada; n = sample size; N = estimated population size.

*$p < 0.05$.

Appendix F: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HIV Questions

	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)			All (n=3,357) (N=13,701)	
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)
Major Modes of Transmission							
Is there a risk of getting HIV if a person has unprotected anal sex? [yes]	2,385	88 (87, 89)	271	85 (83, 87)	4.23*	2,656	88 (87, 89)
Is it possible to get HIV from oral sex? [yes]	2,035	75 (74, 77)	244	77 (75, 80)	1.17	2,279	75 (74, 77)
Is there a risk of getting HIV if a person shoots up with a needle used by someone else? [yes]	2,480	92 (91, 93)	297	95 (93, 96)	5.54*	2,777	92 (91, 93)
Transmission Through Casual Contact							
Is HIV spread by coughing or sneezing? [no]	2,275	84 (83, 86)	299	93 (92, 94)	41.95*	2,574	85 (84, 86)
Is HIV spread from one person to another if they share a drink? [no]	2,079	78 (76, 79)	277	87 (85, 89)	27.57*	2,356	78 (77, 80)
Is HIV spread in swimming pools and hot tubs? [no]	2,122	79 (78, 81)	256	82 (79, 84)	2.12	2,378	79 (78, 81)
Is HIV spread through food? [no]	2,215	83 (81, 84)	287	91 (89, 93)	29.43*	2,502	83 (82, 84)
Prevention							
Can a woman protect herself from getting HIV during sexual intercourse if the man pulls out his penis before he climaxes/cums? [no]	2,197	81 (80, 83)	231	73 (70, 75)	26.63*	2,428	81 (80, 82)
If a person washes their genitals/private parts after sex, can they protect themselves from getting HIV? [no]	2,282	85 (83, 86)	271	85 (83, 87)	0.01	2,553	85 (84, 86)
Is there such a thing as a female condom that can be used by women to protect themselves from getting HIV during sexual intercourse? [yes]	1,619	60 (58, 62)	246	78 (75, 80)	79.44*	1,865	61 (59, 63)
If a person is taking antibiotics, are they protected from getting HIV? [no]	2,294	85 (84, 87)	284	90 (88, 91)	8.72*	2,578	86 (84, 87)
If a person uses Vaseline or baby oil with a condom, does this lower their chance of getting HIV? [no]	1,963	73 (71, 75)	255	81 (79, 83)	20.53*	2,218	73 (72, 75)
Is plastic wrap (Saran wrap) as effective as a condom in protecting a person from getting HIV during sexual intercourse? [no]	2,111	78 (77, 80)	249	79 (77, 82)	0.37	2,360	79 (77, 80)
Testing and Treatment							
Is there medication a person can take that will cure HIV? [no]	2,105	79 (77, 80)	259	82 (80, 84)	3.96*	2,364	79 (77, 80)

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Appendix G: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HIV Questions by Aboriginal Self-Identification

	Men					Women				
	Non-Aboriginal (n=2,281) (N=10,480)		Aboriginal (n=612) (N=2,742)			Non-Aboriginal (n=212) (N=309)		Aboriginal (n=129) (N=170)		
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)	n	% (95% CI)	χ^2 (1)
Major Modes of Transmission										
Is there a risk of getting HIV if a person has unprotected anal sex? [yes]	1,845	88 (87, 90)	484	87 (84, 90)	0.22	167	86 (83, 88)	99	84 (81, 88)	0.26
Is it possible to get HIV from oral sex? [yes]	1,565	75 (73, 77)	418	77 (73, 80)	0.66	155	79 (76, 82)	86	74 (71, 78)	2.61
Is there a risk of getting HIV if a person shoots up with a needle used by someone else? [yes]	1,925	93 (92, 94)	489	89 (86, 92)	5.84*	188	98 (97, 99)	104	89 (86, 92)	33.10*
Transmission Through Casual Contact										
Is HIV spread by coughing or sneezing? [no]	1,749	85 (83, 86)	463	84 (81, 87)	0.01	186	95 (94, 96)	107	89 (86, 92)	10.80*
Is HIV spread from one person to another if they share a drink? [no]	1,591	78 (76, 79)	434	79 (76, 83)	0.49	169	86 (83, 89)	102	87 (83, 90)	0.03
Is HIV spread in swimming pools and hot tubs? [no]	1,635	79 (78, 81)	430	78 (75, 82)	0.20	158	82 (79, 85)	92	80 (76, 84)	0.59
Is HIV spread through food? [no]	1,722	84 (82, 85)	431	78 (74, 82)	6.81*	179	92 (90, 94)	103	88 (85, 91)	3.79
Prevention										
Can a woman protect herself from getting HIV during sexual intercourse if the man pulls out his penis before he climaxes/cums? [no]	1,708	82 (80, 83)	432	79 (76, 83)	1.12	146	75 (72, 80)	80	68 (63, 72)	5.72*
If a person washes their genitals/private parts after sex, can they protect themselves from getting HIV? [no]	1,778	86 (84, 87)	445	81 (78, 84)	5.47*	165	85 (82, 87)	101	85 (82, 89)	0.12
Is there such a thing as a female condom that can be used by women to protect themselves from getting HIV during sexual intercourse? [yes]	1,231	60 (58, 62)	346	63 (58, 67)	1.05	148	77 (73, 80)	93	79 (76, 83)	0.81
If a person is taking antibiotics, are they protected from getting HIV? [no]	1,776	86 (85, 87)	458	84 (81, 87)	0.82	179	92 (90, 94)	100	86 (83, 89)	6.69*
If a person uses Vaseline or baby oil with a condom, does this lower their chance of getting HIV? [no]	1,531	74 (72 , 76)	381	69 (65, 73)	4.31*	163	85 (82, 87)	88	75 (71, 79)	11.14*
Is plastic wrap (Saran wrap) as effective as a condom in protecting a person from getting HIV during sexual intercourse? [no]	1,653	80 (78, 82)	399	73 (69, 76)	10.31*	155	81 (79, 84)	90	77 (73, 81)	2.72
Testing and Treatment										
Is there medication a person can take that will cure HIV? [no]	1,638	80 (78, 81)	408	76 (72, 79)	3.20	159	82 (79, 85)	95	82 (78, 85)	0.10

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*p < 0.05.

Appendix H: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HIV Questions by Health Education Program Attendance

	Men Health Education Program Attendance					Women Health Education Program Attendance				
	Yes (n=1,046) (N= 5,541)		No (n=1,426) (N=7,681)			Yes (n=219) (N=338)		No (n=86) (N=142)		
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)	n	% (95% CI)	χ^2 (1)
Major Modes of Transmission										
Is there a risk of getting HIV if a person has unprotected anal sex? [yes]	909	90 (88, 92)	1,157	87 (86, 89)	1.93	181	87 (84, 89)	69	86 (81, 90)	0.23
Is it possible to get HIV from oral sex? [yes]	792	79 (77, 82)	975	73 (71, 76)	8.78*	163	78 (75, 81)	64	79 (74, 84)	0.04
Is there a risk of getting HIV if a person shoots up with a needle used by someone else? [yes]	946	94 (93, 96)	1,203	91 (90, 93)	6.99*	200	97 (97, 98)	74	91 (87, 95)	16.64*
Transmission Through Casual Contact										
Is HIV spread by coughing or sneezing? [no]	868	87 (86, 89)	1,090	82 (80, 84)	11.28*	202	96 (95, 97)	73	90 (87, 94)	10.79*
Is HIV spread from one person to another if they share a drink? [no]	797	81 (79, 83)	1,001	76 (73, 78)	8.27*	186	89 (87, 91)	67	82 (77, 87)	5.79*
Is HIV spread in swimming pools and hot tubs? [no]	818	83 (80, 85)	1,024	77 (75, 80)	7.80*	179	87 (85, 89)	59	73 (67, 79)	22.46*
Is HIV spread through food? [no]	857	86 (84, 88)	1,059	80 (78, 82)	12.70*	197	96 (95, 97)	70	85 (81, 90)	30.67*
Prevention										
Can a woman protect herself from getting HIV during sexual intercourse if the man pulls out his penis before he climaxes/cums? [no]	826	83 (81, 85)	1,067	80 (78, 82)	2.45	161	77 (75, 80)	54	67 (62, 73)	7.91*
If a person washes their genitals/private parts after sex, can they protect themselves from getting HIV? [no]	863	87 (85, 89)	1,113	84 (82, 86)	1.92	183	88 (86, 90)	69	85 (80, 89)	1.24
Is there such a thing as a female condom that can be used by women to protect themselves from getting HIV during sexual intercourse? [yes]	657	67 (64, 70)	760	57 (55, 60)	15.98*	165	79 (76, 82)	63	78 (73, 83)	0.14
If a person is taking antibiotics, are they protected from getting HIV? [no]	864	87 (85, 89)	1,119	85 (83, 87)	1.78	192	92 (90, 94)	69	85 (81, 90)	8.67*
If a person uses Vaseline or baby oil with a condom, does this lower their chance of getting HIV? [no]	751	75 (72, 78)	952	72 (70, 75)	1.65	173	85 (82, 87)	64	78 (73, 83)	4.12*
Is plastic wrap (Saran wrap) as effective as a condom in protecting a person from getting HIV during sexual intercourse? [no]	813	81 (79, 84)	1,019	77 (75, 80)	3.48	171	83 (80, 86)	59	74 (68, 79)	7.87*
Testing and Treatment										
Is there medication a person can take that will cure HIV? [no]	797	81 (78, 83)	1,029	78 (76, 80)	2.08	179	86 (84, 89)	60	75 (69, 80)	13.16*

Note. HIV = human immunodeficiency virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Appendix I: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HCV Questions

	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)			All (n=3,357) (N=13,701)	
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)
Major Modes of Transmission							
Is it possible for someone to get hepatitis C if they borrow straws and/or crack pipes to snort or smoke cocaine? [yes]	1,848	68 (66, 70)	227	72 (70, 75)	4.49*	2,075	68 (67, 70)
Is it possible for a person to get hepatitis C if they have unprotected sexual intercourse? [yes]	2,157	80 (78, 81)	248	79 (77, 82)	0.01	2,405	80 (78, 81)
Is there a risk of getting infected with hepatitis C while getting a tattoo or piercing? [yes]	2,447	91 (90, 92)	287	91 (89, 93)	0.00	2,734	91 (90, 92)
Is there a risk of getting hepatitis C if a person injects with a needle used by someone else? [yes]	2,430	91 (90, 92)	281	90 (89, 92)	0.18	2,711	91 (90, 92)
Is it possible for a person to get hepatitis C if they borrow a razor or a toothbrush from someone? [yes]	2,291	86 (85, 87)	275	88 (86, 90)	1.31	2,566	86 (85, 87)
Transmission Through Casual Contact							
Is hepatitis C spread through food? [no]	1,757	66 (64, 68)	250	79 (77, 82)	45.58*	2,007	66 (65, 68)
Is hepatitis C spread in hot tubs and swimming pools? [no]	1,779	67 (65, 69)	228	73 (70, 76)	10.47*	2,007	67 (65, 69)
Is hepatitis C spread by coughing or sneezing? [no]	1,720	65 (63, 67)	244	79 (77, 82)	50.33*	1,964	66 (64, 67)
Is hepatitis C spread from one person to another if they share a drink? [no]	1,376	52 (50, 54)	227	73 (70, 75)	93.35*	1,603	53 (51, 55)
Prevention							
Is there a vaccine that can prevent people from getting hepatitis C? [no]	1,423	53 (51, 55)	180	57 (54, 60)	4.54*	1,603	53 (51, 55)
If a person is taking antibiotics, are they safe from getting hepatitis C? [no]	1,978	75 (73, 76)	243	79 (76, 81)	4.83*	2,221	75 (73, 76)
Testing and Treatment							
Is it true that some people live for many years with hepatitis C without feeling sick? [yes]	2,043	77 (76, 79)	256	82 (80, 85)	8.57*	2,299	77 (76, 79)
Is it possible, with the use of medication, to no longer be able to detect hepatitis C in a person's blood? [yes]	1,031	40 (38, 42)	153	49 (46, 52)	16.90*	1,184	41 (39, 42)
Once a person's hepatitis C has been treated and the virus can't be detected in their blood, is it possible for them to get re-infected with hepatitis C? [yes]	1,651	62 (60, 64)	212	68 (65, 71)	9.44*	1,863	62 (61, 64)

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size.
*$p < 0.05$.

Appendix J: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HCV Questions by Aboriginal Self-Identification

	Men					Women				
	Non-Aboriginal (n=2,281) (N=10,480)		Aboriginal (n=612) (N=2,742)			Non-Aboriginal (n=212) (N=309)		Aboriginal (n=129) (N=170)		
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)	n	% (95% CI)	χ^2 (1)
Major Modes of Transmission										
Is it possible for someone to get hepatitis C if they borrow straws and/or crack pipes to snort or smoke cocaine? [yes]	1,437	69 (67, 71)	364	66 (62, 70)	0.99	142	74 (71, 78)	82	70 (66, 74)	1.74
Is it possible for a person to get hepatitis C if they have unprotected sexual intercourse? [yes]	1,659	80 (78, 81)	442	81 (77, 84)	0.33	159	83 (80, 86)	84	73 (69, 77)	12.21*
Is there a risk of getting infected with hepatitis C while getting a tattoo or piercing? [yes]	1,888	92 (91, 93)	498	91 (89, 94)	0.05	181	94 (92, 96)	102	88 (85, 91)	10.06*
Is there a risk of getting hepatitis C if a person injects with a needle used by someone else? [yes]	1,874	91 (90, 92)	491	91 (88, 93)	0.17	173	91 (89, 93)	103	89 (87, 92)	0.76
Is it possible for a person to get hepatitis C if they borrow a razor or a toothbrush from someone? [yes]	1,757	86 (84, 87)	475	87 (85, 90)	0.77	171	89 (86, 91)	101	88 (85, 91)	0.06
Transmission Through Casual Contact										
Is hepatitis C spread through food? [no]	1,350	66 (64, 68)	363	68 (64, 72)	1.01	154	80 (77, 83)	92	79 (76, 83)	0.07
Is hepatitis C spread in hot tubs and swimming pools? [no]	1,366	67 (65, 69)	364	68 (64, 72)	0.18	141	74 (71, 78)	81	69 (65, 74)	2.12
Is hepatitis C spread by coughing or sneezing? [no]	1,329	65 (63, 67)	350	66 (62, 70)	0.03	153	81 (78, 84)	85	74 (70, 78)	5.31*
Is hepatitis C spread from one person to another if they share a drink? [no]	1,038	51 (49, 53)	304	57 (53, 61)	4.19*	144	75 (71, 78)	78	68 (63, 72)	4.60*
Prevention										
Is there a vaccine that can prevent people from getting hepatitis C? [no]	1,128	54 (52, 56)	257	48 (44, 52)	4.44*	121	62 (59, 66)	57	50 (45, 54)	12.58*
If a person is taking antibiotics, are they safe from getting hepatitis C? [no]	1,547	76 (74, 78)	382	71 (67, 75)	4.32*	154	81 (78, 84)	85	75 (71, 79)	3.72
Testing and Treatment										
Is it true that some people live for many years with hepatitis C without feeling sick? [yes]	1,579	78 (76, 79)	409	76 (72, 79)	0.68	159	83 (80, 86)	93	83 (80, 86)	0.00
Is it possible, with the use of medication, to no longer be able to detect hepatitis C in a person's blood? [yes]	786	40 (38, 42)	217	43 (38, 47)	0.96	96	49 (45, 53)	53	47 (42, 52)	0.42
Once a person's hepatitis C has been treated and the virus can't be detected in their blood, is it possible for them to get re-infected with hepatitis C? [yes]	1,262	61 (59, 64)	349	65 (61, 69)	2.14	136	71 (67, 75)	74	66 (62, 70)	2.19

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size. *$p < 0.05$.

Appendix K: Percent of Canadian Federal Inmates Correctly Answering Knowledge of HCV Questions by Health Education Program Attendance

	Men Health Education Program Attendance					Women Health Education Program Attendance				
	Yes (n=1,046) (N = 5,541)		No (n = 1,426) (N = 7,681)			Yes (n = 219) (N = 338)		No (n = 86) (N = 142)		
	n	% (95% CI)	n	% (95% CI)	χ^2 (1)	n	% (95% CI)	n	% (95% CI)	χ^2 (1)
Major Modes of Transmission										
Is it possible for someone to get hepatitis C if they borrow straws and/or crack pipes to snort or smoke cocaine? [yes]	729	73 (71, 76)	873	65 (62, 68)	14.79*	155	75 (72, 78)	54	69 (63, 75)	2.53
Is it possible for a person to get hepatitis C if they have unprotected sexual intercourse? [yes]	823	82 (80, 85)	1,051	79 (77, 81)	2.33	169	82 (79, 85)	61	78 (72, 83)	1.68
Is there a risk of getting infected with hepatitis C while getting a tattoo or piercing? [yes]	922	93 (92, 95)	1,192	91 (89, 92)	3.62	193	93 (91, 95)	71	90 (86, 94)	1.74
Is there a risk of getting hepatitis C if a person injects with a needle used by someone else? [yes]	928	94 (92, 95)	1,172	89 (88, 91)	11.60*	194	95 (93, 96)	65	85 (80, 89)	18.23*
Is it possible for a person to get hepatitis C if they borrow a razor or a toothbrush from someone? [yes]	880	89 (87, 91)	1,109	85 (83, 87)	7.32*	189	92 (90, 94)	64	80 (75, 86)	15.05*
Transmission Through Casual Contact										
Is hepatitis C spread through food? [no]	696	71 (69, 74)	841	64 (61, 67)	10.92*	170	82 (79, 85)	59	75 (69, 81)	3.24
Is hepatitis C spread in hot tubs and swimming pools? [no]	692	71 (68, 74)	873	66 (64, 69)	5.16*	161	79 (76, 82)	47	60 (53, 66)	25.34*
Is hepatitis C spread by coughing or sneezing? [no]	676	69 (66, 72)	829	64 (61, 66)	5.84*	167	83 (80, 85)	57	72 (66, 78)	9.09*
Is hepatitis C spread from one person to another if they share a drink? [no]	548	57 (53, 60)	663	51 (48, 54)	5.39*	159	77 (74, 80)	48	62 (55, 68)	16.35*
Prevention										
Is there a vaccine that can prevent people from getting hepatitis C? [no]	548	56 (53, 59)	692	52 (49, 55)	2.55	127	62 (58, 66)	40	50 (44, 57)	7.64*
If a person is taking antibiotics, are they safe from getting hepatitis C? [no]	769	78 (76, 81)	966	74 (71, 76)	5.33*	174	85 (83, 88)	52	67 (61, 73)	29.71*
Testing and Treatment										
Is it true that some people live for many years with hepatitis C without feeling sick? [yes]	795	82 (80, 84)	992	76 (73, 78)	10.65*	175	86 (83, 88)	61	78 (72, 83)	6.01*
Is it possible, with the use of medication, to no longer be able to detect hepatitis C in a person's blood? [yes]	404	43 (40, 46)	517	41 (38, 43)	0.89	107	52 (49, 56)	30	38 (32, 44)	11.35*
Once a person's hepatitis C has been treated and the virus can't be detected in their blood, is it possible for them to get re-infected with hepatitis C? [yes]	662	67 (64, 70)	794	61 (58, 63)	7.45*	147	73 (69, 76)	50	63 (57, 69)	5.71*

Note. HCV = hepatitis C virus; n = sample size; N = estimated population size. *p < 0.05.

Appendix L: Knowledge of HIV Among the Canadian Population and Aboriginal Peoples in 2006

Knowledge	Canadians[a]	Aboriginal Peoples		
		First Nations	Inuit	Metis
	n=2,036	n=985	n=204	n=408
% aware that HIV/AIDS cannot be cured	89	85	74	83
% reporting that HIV can be passed by…				
Sharing drug needles	99	97	95	95
Unprotected oral sex	81	80	75	79
Unprotected sex between a man and woman	100	98	96	97
Unprotected sex between two men	98	96	92	96
A sneeze or cough	11	18	19	16
Casual contact	5	6	9	7

Note. Estimates obtained from HIV/AIDS Attitudinal Surveys completed by EKOS Research Associates in 2006 (EKOS Research Associates, 2006a, 2006b). Random digit dialing was used to identify Canadians over the age of 15 years for community-based telephone surveys. Participation rates ranged from 24% in the general population survey to 46% in the off-reserve Aboriginal peoples survey. Estimates were weighted to reflect population proportions in terms of gender, age, and region.

[a]The estimates for Canadians include Aboriginal peoples.

Appendix M: a Comparison of the Percent of Canadian Federal Inmates Correctly Answering Similar HIV and HCV Knowledge Questions

	Men (n=3,006) (N=13,222)				Women (n=351) (N=479)				All (n=3,357) (N=13,701)			
	HIV		HCV		HIV		HCV		HIV		HCV	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Major Modes of Transmission												
Is there a risk of getting (HIV/hepatitis C) if a person (shoots up/injects) with a needle used by someone else? [yes]	2,480	92 (91, 93)	2,447	91 (90, 92	297	95 (93, 96)	247	91 (89, 93)	2,777	92 (91, 93)	2,711	91 (90, 92)
Transmission Through Casual Contact												
Is (HIV/hepatitis C) spread by coughing or sneezing? [no]	2,275	84 (83, 86)	1,720	65 (63, 67)	299	93 (92, 94)	244	79 (77, 82)	2,574	85 (84,86)	1,964	66 (64, 67)
Is (HIV/hepatitis C) spread from one person to another if they share a drink? [no]	2,079	78 (76, 79)	1,376	52 (50,54)	277	87 (85, 89)	227	73 (70,75)	2,356	78 (77, 80)	1,603	53 (51, 55)
Is (HIV/hepatitis C) spread in swimming pools and hot tubs? [no]	2,122	79 (78, 81)	1,779	67 (65, 69)	256	82 (79, 84)	228	73 (70, 76)	2,378	79 (78, 81)	2,007	67 (65, 69)
Is (HIV/hepatitis C) spread through food? [no]	2,215	83 (81, 84)	1,757	66 (64, 68)	287	91 (89, 93)	250	79 (77,82)	2,502	83 (82, 84)	2,007	66 (65, 68)
Prevention												
If a person is taking antibiotics, are they (protected/safe) from getting (HIV/hepatitis C)? [no]	2,294	85 (84, 87)	1,978	75 (73, 76)	284	90 (88, 91)	243	79 (76, 81)	2,578	86 (84, 87)	2,221	75 (73, 76)
Testing and Treatment												
Is there medication a person can take that will cure HIV? [no]	2,105	79 (77, 80)			259	82 (80, 84)			2,364	79 (77, 80)		
Is it possible, with the use of medication, to no longer be able to detect hepatitis C in a person's blood? [yes]			1,031	40 (38, 42)			153	49 (46, 52)			1,184	41 (39, 42)

Note. HIV = human immunodeficiency virus; HCV = hepatitis C virus; n = sample size; N = estimated population size.
*p < 0.05.