Hepatitis C: A Literature Scan focussing on the International Dimensions

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March 2006

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Preface

This scan of the literature was undertaken on behalf of the Public Health of Canada (PHAC). It formed the basis for and accompanies the report on Hepatitis C Virus (HCV), titled: “Hepatitis C: Strategic Issues towards a Global Awareness Campaign.” The report was prepared as a result of the concern of PHAC that issues related to HCV have not received sufficient global recognition. As a result of the lack of sufficient resources and attention, the progress in tackling the disease has been uneven and sporadic, and, it has been termed as a ‘silent epidemic.’

The focus of attention in this survey is on the issues of prevalence, epidemiology, and public health policies in the developing countries. However, important and relevant research from the developed (or OECD) countries has been included for comparitive purposes.

The literature scan seved to provide a basis for the report to PHAC on the need for increased global awareness (see above). It is the aim of PHAC to use these outputs towards further consultation with stakeholders. The report and the literature scan will also be used for discussions at a workshop at the 13th Canadian Conference on International Health (CCIH) organised jointly by PHAC and the Canadian Society for International Health (CSIH) in October 2006.

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Abstract Index

Blood Safety

AUTHOR(S)	
TITLE	**Progress report on the regional initiative for blood Safety and plan of action for 2006-2010**
PUBLICATION	**Pan American Health organization. World Health Organization. 46th Directing Council 57th Session of the Regional Committee Washington, D.C., USA, 26-30 September 2005 Provisional Agenda item 4.11 cd46/16 (eng.) 1 august 2005**
URL	http://www.paho.org/Spanish/AD/THS/EV/Blood-CD46R16-Informeprogresos.pdf
ABSTRACT	Voluntary blood donation is a key element in PAHO's regional blood safety strategy. Blood from voluntary donors is significantly safer than blood given for payment or even "replacement" blood from patients' friends and family members. Paid blood donations are nearly 40 times more likely to screen positive for hepatitis C and 175 times more likely to screen positive for HIV. Other diseases transmitted by blood in the Americas include Chagas' disease and syphilis.

AUTHOR(S)	**Jo Anne Chiavetta, Michael Escobar, Alice M. Newman, Yaohua He, Pete Driezen, Shelley Deeks, Devon E. Hone, Sheila F. O'Brien and Graham Sher**
TITLE	**Incidence and estimated rates of residual risk for HIV, hepatitis C, hepatitis B and human T-cell lymphotropic viruses in blood donors in Canada, 1990–2000**
PUBLICATION	CMAJ • October 14, 2003; 169 (8)
URL	http://www.cmaj.ca/cg i/content/full/169/8/767
ABSTRACT	Background: Since 1990, the Canadian Red Cross Society and Canadian Blood Services have been testing blood donors for hepatitis C virus (HCV) antibody and HCV nucleic acids and have supplemented HIV antibody testing with p24 antigen testing. We report trends in the incidence of blood-transmissible viral markers and estimates of the risk of undetected infection in donors over the last decade. Methods: We extracted anonymous donor and blood-transmissible disease information from the Canadian Blood

	Services National Epidemiology Donor Database for 8.9 million donations from 2.1 million donors between June 1990 and December 2000. The risk of transfusion-transmitted infection (or "residual risk") refers to the chance that an infected donation escapes detection because of a laboratory test's window period (i.e., the time between infection and detection of the virus by that test). We determined the probability of residual contamination of a unit of blood after testing by using the incidence/window period model, which is based on the incidence of infection in repeat donors and the window period for each laboratory test. The viral markers evaluated in the study were HIV, HCV, hepatitis B virus (HBV) and human T-cell lymphotropic virus (HTLV). Results: Except for HBV, the transmissible-disease rates of the other evaluated viruses decreased over the study period, with less of a decrease for HTLV. In 2000, the transmissible-disease–positive rate per 100 000 donations was 0.38 for HIV, 16.83 for HCV, 12.40 for HBV and 1.77 for HTLV. The residual risk of HIV, HCV and HTLV decreased over the study period; the residual risk of HBV fluctuated throughout the decade. The current residual risk per million donations is 0.10 for HIV, 0.35 for HCV, 13.88 for HBV and 0.95 for HTLV. Interpretation: Except for HBV, the estimated risk of undetected infection (residual risk) has decreased over time. The rates of transmissible disease and the probability of undetected transmission of infection are at par with, if not lower than, those reported for other industrialized countries.

AUTHOR(S)	**Schmunis GA, Cruz JR.**
TITLE	**Safety of the blood supply in Latin America.**
PUBLICATION	Clin Microbiol Rev. 2005 Jan;18(1):12-29.
URL	
ABSTRACT	Appropriate selection of donors, use of sensitive screening tests, and the application of a mandatory quality assurance system are essential to maintain the safety of the blood supply. Laws, decrees, norms, and/or regulations covering most of these aspects of blood transfusion exist in 16 of the 17 countries in Latin America that are the subject of this review. In 17 countries, there is an information system that, although still incomplete (there are no official reports on adverse events and incidents), allows us to establish progress made on the status of the blood supply since 1993. Most advances originated in increased screening coverage for infectious diseases and better quality assurance. However, in 2001 to 2002, tainted blood may have caused infections in 12 of the 17 countries; no country reached the number of donors considered adequate, i.e., 5% of the population, to avoid blood shortages, or decreased significantly

	the number of blood banks, although larger blood banks are more efficient and take advantage of economies of scale. In those years, paid donors still existed in four countries and replacement donors made up >75% of the blood donors in another eight countries. In addition, countries did not report the number of voluntary donors who were repeat donors, i.e., the healthiest category. In spite of progress made, more improvements are needed.

Genotypes

AUTHOR(S)	**Morice Y, Roulot D, Grando V, Stirnemann J, Gault E, Jeantils V, Bentata M, Jarrousse B, Lortholary O, Pallier C, Deny P.**
TITLE	**Phylogenetic analyses confirm the high prevalence of hepatitis C virus (HCV) type 4 in the Seine-Saint-Denis district (France) and indicate seven different HCV-4 subtypes linked to two different epidemiological patterns.**
PUBLICATION	**J. Gen. Virol., May 2001; 82: 1001 - 1012.**
URL	http://vir.sgmjournals.org/cgi/content/full/82/5/1001
ABSTRACT	Hepatitis C virus (HCV) has been classified into six clades as a result of high genetic variability. In the Seine-Saint-Denis district of north-east Paris, the prevalence of HCV-4, which usually infects populations from Africa or the Middle East, is twice as high as that recorded for the whole of continental France (10.2 versus 4.5%). Although the pathogenicity of HCV-4 remains unknown, resistance of HCV-4 to therapy appears to be similar to that observed for HCV-1. In order to characterize the epidemiology of HCV-4 in Paris, sequences of the non-structural 5B gene (332 bp) were obtained from 38 HCV-4-infected patients. Extensive phylogenetic analyses indicated seven different HCV-4 subtypes. Moreover, phylogenetic tree topologies clearly distinguished two epidemiological profiles. The first profile (52.6% of patients) reflects the intra-suburban emergence of two distinct HCV-4 subclades occurring mainly among intravenous drug users (65% of patients). The second profile shows six subclades [HCV-4a, -4f, -4h, -4k, -4a(B) and a new sequence] and accounts for patients from Africa (Egypt and sub-Saharan countries) who have unknown risk factors (77.8% of patients) and in whom no recent diffusion of HCV-4 is evident. This study indicates the high diversity of HCV-4 and the extension of HCV-4a and -4d subclades among drug users in FRANCE:

AUTHOR(S)	**Pujol FH, Loureiro CL, Devesa M, Blitz L, Parra K, Beker S, Liprandi F.**
TITLE	**Determination of Genotypes of Hepatitis C Virus in Venezuela by Restriction Fragment Length Polymorphism**
PUBLICATION	**Journal Of Clinical Microbiology, July 1997, p. 1870–1872 Vol. 35, No. 7**
URL	http://jcm.asm.org/cgi/reprint/35/7/1870?view=reprint&pmid=9196212
ABSTRACT	Hepatitis C virus genotypes in Venezuela were analyzed by restriction fragment length polymorphism in the 5' noncoding region. The absence of BstUI digestion was found to be a useful marker for genotype 2 specimens. From 122 serum samples, 66, 20, and 2.5% were classified as genotypes 1, 2, and 3, respectively; 0.8% were classified as genotype 4; and 10% appeared to be mixed infections.

AUTHOR(S)	**Chen YD, Liu MY, Yu WL, Li JQ, Peng M, Dai Q, Liu X, Zhou ZQ.**
TITLE	**Hepatitis C virus infections and genotypes in China.**
PUBLICATION	**Hepatobiliary Pancreat Dis Int. 2002 May;1(2):194-201.**
URL	
ABSTRACT	OBJECTIVE: To define the conditions of hepatitis C virus (HCV) infections, and geographic and demographic distributions of genotypes in China. METHODS: HCV infected patients were selected from individuals with different patterns of liver diseases and high risk populations in different parts of China. Genotypes of HCV in some isolates were further analyzed, based on the data from our laboratory studies and some carefully selected published literatures. RESULTS: The anti-HCV positive rates were 9.7% in patients with acute hepatitis, 13.3% in patients with chronic hepatitis, 18.3% in patients with hepatocellular carcinoma, 33.0% in patients with liver cirrhosis, and 43.2% in patients with posttransfusional hepatitis (average, 16.2% in patients with liver diseases). The anti-HCV positive rates in the high risk populations were 36.4% in leukemic patients, 43.0% in hemodialysis patients, 12.7% in blood donors, 64.1% in drug abusers, 13.1% in prostitutes, and 2.57% in naturally healthy people. At least 4 clades (clades 1, 2, 3 and 6) of HCV were found in China with different geographic and demographic distributions. Genotype 1b was the most widely distributed

	genotype, and genotype 3 was mainly found in Yunnan Province, Southwest China. CONCLUSION: China has a high incidence of HCV infection. Our results will provide a strategic basis for diagnosis, treatment and possibly prophylaxis of hepatitis C virus diseases

HIV/HCV Co-infection

AUTHOR(S)	**Curr Treat Options Gastroenterol. 2005 Dec; 8(6): 433-41**
TITLE	**Management of Chronic Hepatitis C Virus in Patients with HIV.**
PUBLICATION	**Santos SA; Kontorinis N; Dieterich DT**
URL	
ABSTRACT	The primary goal of HCV therapy is permanent eradication of the virus. Secondary goals include reduction in hepatic fibrosis progression, development of decompensated cirrhosis, and hepatocellular carcinoma. Early studies using standard interferon-alfa for the treatment of HCV in co -infected individuals were discouraging, as poor outcomes, high discontinuation rates, and severe adverse events were observed. The current standard of care for treatment of HCV is pegylated-interferon and ribavirin. New studies have recently demonstrated a higher sustained virologic response rate and a better adverse event profile than previously reported in co-infected patients.

AUTHOR(S)	**Curr Treat Options Gastroenterol. 2005 Dec; 8(6): 433-41**
TITLE	**Management of Chronic Hepatitis C Virus in Patients with HIV.**
PUBLICATION	**Santos SA; Kontorinis N; Dieterich DT**
URL	
ABSTRACT	The life expectancy of HIV seropositive persons is approaching the life expectancy of those who are uninfected with HIV. Hepatitis C virus (HCV) infection has emerged as a worldwide epidemic. Given the similar transmission route between HCV

	and HIV, there has been an explosion in the number of individuals infected with both viruses. Because of the successful introduction of antiretroviral therapy, patients are more susceptible to new opportunistic infections such as HCV. HCV leads to a more rapid progression to end-stage liver disease in patients with HIV, and the morbidity and mortality related to HCV in co-infected patients is on the rise. Therefore, it has become imperative to treat both HIV and HCV in co-infected patients. The primary goal of HCV therapy is permanent eradication of the virus. Secondary goals include reduction in hepatic fibrosis progression, development of decompensated cirrhosis, and hepatocellular carcinoma. Early studies using standard interferon-alfa for the treatment of HCV in co-infected individuals were discouraging, as poor outcomes, high discontinuation rates, and severe adverse events were observed. The current standard of care for treatment of HCV is pegylated-interferon and ribavirin. New studies have recently demonstrated a higher sustained virologic response rate and a better adverse event profile than previously reported in co-infected patients. As a result, we recommend considering all co-infected patients for HCV therapy while watching closely for unique treatment-related toxicities. The treatment of HCV in co-infected patients should be a high priority for all providers.

AUTHOR(S)	**Ferrero S; Bertoldi S; Lungaro P; Nicoletti A; Gotta C; et al**
TITLE	**HIV-HCV co-infection during pregnancy.**
PUBLICATION	**Minerva Ginecol. 2005 Dec; 57(6): 627-35**
URL	
ABSTRACT	AIM: Hepatitis C virus (HCV) infection is common in human immunodeficiency virus (HIV) infected individuals in the United States and in Western Europe. The aim of this study is to describe our experience in the management of HIV-HCV co-infected women during pregnancy and to report the rates of HIV and HCV vertical transmission in this particular population. METHODS: This is a prospective study including all HIV-HCV coinfected women who delivered in the major public hospital of Genoa from April 1990 to December 2002. The method of delivery and breastfeeding habits were recorded. The babies were monitored at the paediatric referral centre. RESULTS: Thirty-nine HIV-HCV co-infected pregnant women were included in the analysis, 2 of these women delivered twice during the study period. The mean age (+/-SD) of this population at delivery was 30.4+/-4.9 years. Thirty-four (87.2%) HIV-HCV co-infected women had a history of intravenous drug use. Seventeen

	(43.5%) women reported regular alcohol intake during pregnancy. Forty-one infants were born during the study period. There was no case of HIV-vertical transmission in our population. Thirty-six (87.8%) of 41 babies were born to women with positive HCV-RNA. Two babies (4.9%) were HCV-infected. CONCLUSIONS: The improved prognosis for HIV-infected people has increased the desire of parenthood. There is no evidence to support advising against pregnancy in HIV-HCV co-infected women.

AUTHOR(S)	**Kottilil S, Jackson JO, Polis MA.**
TITLE	**Hepatitis B & hepatitis C in HIV-infection.**
PUBLICATION	**Indian J Med Res. 2005 Apr;121(4):424-50.**
URL	http://www.icmr.nic.in/ijmr/2005/April/0418.pdf
ABSTRACT	Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) are the three most common chronic viral infections seen in the world. All three viruses share modes of transmission and hence co-exist in the same host at significantly high rates. HIV-induced immunosuppression has deleterious effects on the natural history, pathophysiology, diagnosis, therapeutic responses to hepatitis viruses. Responses to HBV vaccination are impaired in persons with HIV infection. Co-infection with the hepatitis viruses and HIV is likely to become a major health care catastrophe in the coming years. This review discusses the current trends in the understanding of the biology of co-infection and implications for treating these viruses effectively.

AUTHOR(S)	**Kottilil S; Jackson JO; Polis MA**
TITLE	**Hepatitis B & hepatitis C in HIV-infection**
PUBLICATION	**Indian J Med Res. 2005 Apr; 121(4): 424-50**
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ABSTRACT	Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) are the three most common chronic viral infections seen in the world. All three viruses share modes of transmission and hence co-exist in the same host at significantly high rates. HIV-induced immunosuppression has deleterious effects on the natural history, pathophysiology, diagnosis, therapeutic responses to hepatitis viruses. Responses to HBV vaccination are impaired in persons with HIV infection. Co-infection with the hepatitis viruses and HIV is likely to become a major health care catastrophe in the coming years. This review discusses the current trends in the understanding of

	the biology of co-infection and implications for treating these viruses effectively.

AUTHOR(S)	**Paris R, Sirisopana N, Benenson M, Amphaiphis R, Tuntichaivanich C, Myint KS, Brown AE.**
TITLE	**The association between hepatitis C virus and HIV-1 in preparatory cohorts for HIV vaccine trials in Thailand.**
PUBLICATION	**AIDS. 2003 Jun 13;17(9):1363-7.**
URL	
ABSTRACT	OBJECTIVES: To study the association between hepatitis C virus (HCV) and HIV-1, and HCV seropositivity as an indicator of HIV-1 risk behavior for HIV vaccine preparatory cohorts in Thailand. DESIGN: Cross-sectional study of HIV-1-infected persons identified at screening for potential HIV vaccine trial cohort studies. METHODS: Sera from HIV-1-infected and uninfected volunteers was matched by age, sex, and community, and tested for HCV reactivity. Logistic regression methods were used to measure associations between HIV-1, HCV and other risk factors for HIV infection. RESULTS: The prevalence of HCV among HIV-negative controls was 8.3% (6/72) for men and 4.2% (5/118) for women. Co-infection with HIV and occurred in 50.7% (37/73) of men and 3.4% (4/118) of women. Among men who reported injection drug use (IDU), 96.4% (27/28) were HCV seropositive. No women reported IDU. HCV was associated with HIV infection [odds ratio (OR), 11.3; 95% confidence interval (CI), 4.4-29.3] and IDU (OR, 12.0; 95% CI, 3.4-41.9) among men, but not women (OR, 0.8; 95% CI, 0.2-3.0). After adjustment for potential confounding, HCV, but not IDU, remained strongly associated with HIV-1 infection among men (OR, 9.4; 95% CI, 2.7-32.6). CONCLUSIONS: The strong associations between HCV seropositivity, HIV-1 infection, and IDU history suggest that IDU was reported accurately in this study. The surprisingly high prevalence of HCV among HIV-1-infected young men may assist health policy makers in the choice of behavioral interventions for this important subgroup of the population.

AUTHOR(S)	**Remis, Robert S.**
TITLE	**Estimating the Number of Persons co-infected with Hepatitis C Virus and Human Immunodeficiency Virus in Canada**
PUBLICATION	**Hepatitis C Division** **Population and Public Health Branch** **Health Canada**

	March 31, 2001
URL	
ABSTRACT	Since infection with HIV may complicate the management of patients with chronic hepatitis C virus (HCV) infection and vice versa, we wished to quantify and characterize the extent of dual HCV-HCV infection in Canada. In the first stage of the analysis, we estimated the number of persons infected with HIV according to HIV-defined exposure categories and province/region as of December 1999. Using data from published studies and unpublished reports and the results of a consensus among expert consultants, we estimated the expected HCV prevalence among HIV-infected persons in each HIV defined exposure category for each region. Where appropriate, we adjusted for regional differences in HCV prevalence. The prevalence of HCV-HIV infection was then determined by multiplying the number of HIV-infected persons in each category times the HCV prevalence. We also estimated, specifically, the number of HCV-HIV infected Aboriginal persons and persons incarcerated in Canadian prisons. We calculated 95% confidence limits around our estimates using Monte-Carlo simulation. As of December 1999, an estimated 11,194 persons in Canada were infected with HCV and HIV, with 95% confidence limits of 9,400 and 13,300. 87% of dually infected persons live in Quebec (34%), British Columbia (29%) or Ontario (25%). We estimate that 7,921 injection drug users (IDUs) and 1,648 men who have sex with men and also inject drugs (MSM-IDU) were dually infected, accounting for 71% and 15%, respectively, of dually infected persons in Canada. Finally, we estimated that 1,477 Aboriginal persons and 611 persons incarcerated in federal and provincial prisons had HCV-HIV infection. Our analysis is subject to uncertainty due mostly to the lack of precise Canadian serologic data on persons with combined infection. Nevertheless, the number of persons in Canada with dual HCV-HIV infection is undoubtedly substantial. The majority of such persons are (IDU) or MSM-IDUs and are concentrated in Quebec, British Columbia and Ontario. It is unknown what proportion of these persons are aware they are infected with both viruses.

AUTHOR(S)	**Santos SA, Kontorinis N, Dieterich DT.**
TITLE	**Management of Chronic Hepatitis C Virus in Patients with HIV.**
PUBLICATION	Curr Treat Options Gastroenterol. 2005 Dec;8(6):433-41.
URL	
ABSTRACT	The life expectancy of HIV seropositive persons is approaching

	the life expectancy of those who are uninfected with HIV. Hepatitis C virus (HCV) infection has emerged as a worldwide epidemic. Given the similar transmission route between HCV and HIV, there has been an explosion in the number of individuals infected with both viruses. Because of the successful introduction of antiretroviral therapy, patients are more susceptible to new opportunistic infections such as HCV. HCV leads to a more rapid progression to end-stage liver disease in patients with HIV, and the morbidity and mortality related to HCV in co-infected patients is on the rise. Therefore, it has become imperative to treat both HIV and HCV in co-infected patients. The primary goal of HCV therapy is permanent eradication of the virus. Secondary goals include reduction in hepatic fibrosis progression, development of decompensated cirrhosis, and hepatocellular carcinoma. Early studies using standard interferon-alfa for the treatment of HCV in co-infected individuals were discouraging, as poor outcomes, high discontinuation rates, and severe adverse events were observed. The current standard of care for treatment of HCV is pegylated-interferon and ribavirin. New studies have recently demonstrated a higher sustained virologic response rate and a better adverse event profile than previously reported in co-infected patients. As a result, we recommend considering all co-infected patients for HCV therapy while watching closely for unique treatment-related toxicities. The treatment of HCV in co-infected patients should be a high priority for all providers.

Natural History

AUTHOR(S)	**Schuppan D, Krebs A, Bauer M, Hahn EG**
TITLE	**Hepatitis C and liver fibrosis**
PUBLICATION	**Cell Death Differ. 2003 Jan;10 Suppl 1:S59-67.**
URL	http://www.nature.com/cdd/journal/v10/n1s/pdf/4401163a.pdf
ABSTRACT	Chronic hepatitis C progresses to cirrhosis within 20 years in an estimated 20-30% of patients, while running a relatively uneventful course in most others. Certain HCV proteins, such as core and NS5A, can induce derangement of lipid metabolism or alter signal transduction of infected hepatocytes which leads to the production of reactive oxygen radicals and profibrogenic mediators, in particular TGF-beta1. TGF-beta1 is the strongest known inducer of fibrogenesis in the effector cells of hepatic fibrosis, i.e. activated hepatic stellate cells and myofibroblasts. However, fibrogenesis proceeds only when additional profibrogenic stimuli are present, e.g. alcohol exposure, metabolic disorders such as non-alcoholic steatohepatitis, or

	coinfections with HIV or Schistosoma mansoni that skew the immune response towards a Th2 T cell reaction. Furthermore, profibrogenic polymorphisms in genes that are relevant during fibrogenesis have been disclosed. This knowledge will make it possible to identify those patients who are most likely to progress and who need antiviral or antifibrotic therapies most urgently. However, even the best available treatment, the combination of pegylated interferon and ribavirin, which is costly and fraught with side effects, eradicates HCV in only 50% of patients. While the suggestive antifibrotic effect of interferons (IF-gamma>alpha,beta), irrespective of viral elimination, has to be proven in randomised prospective studies, additional, well tolerated and cost-effective antifibrotic therapies have to be developed. The combination of cytokine strategies, e.g. inhibition of the key profibrogenic mediator TGF-beta, with other potential antifibrotic agents appears promising. Such adjunctive agents could be silymarin, sho-saiko-to, halofuginone, phosphodiesterase inhibitors, and endothelin-A-receptor or angiotensin antagonists. Furthermore, drug targeting to the fibrogenic effector cells appears feasible. Together with the evolving validation of serological markers of hepatic fibrogenesis and fibrolysis an effective and individualised treatment of liver fibrosis is anticipated.

AUTHOR(S)	**Slowik MK; Jhaveri R**
TITLE	**Hepatitis B and C viruses in infants and young children.**
PUBLICATION	**Semin Pediatr Infect Dis. 2005 Oct; 16(4): 296-305**
URL	
ABSTRACT	Advances during the past 20 years have led to a better understanding of the prevention, diagnosis, and treatment of acute and chronic hepatitis B (HBV) and hepatitis C (HCV) infections in the pediatric population. Universal vaccination and prenatal testing for HBV have decreased the incidence rate of acute HBV infections from more than 3/100,000 to 0.34/100,000 in all children. Diagnosis of chronic HBV is confirmed with positive serologic testing on two occasions at least 6 months apart. Current approved therapies with interferon alpha and lamivudine for children with chronic HBV infection have shown some efficacy, but results have been variable. In contrast, the lack of an effective HCV vaccine and the risk of mother-to-child transmission may increase the number of children with vertically acquired HCV that ultimately go on to develop liver fibrosis or cirrhosis. Diagnosis of HCV in the neonate should be postponed until after the child reaches 1 year of age because infants may

	have transient viremia. Treatment for HCV infected children has not been studied extensively. Peginterferon alpha-2a and Ribavirin are not currently approved for pediatric use; however, recent studies in children have shown potential benefit. More effective and less toxic therapies for young patients with HBV and HCV are needed, as are methods to interrupt perinatal transmission of HBV and HCV.

AUTHOR(S)	**José F. Vera**
TITLE	**Hepatitis C (HC) en niños y adolescentes**
PUBLICATION	**Rev Colomb Gastroenterol 2004;19 (3 Supl):S41-S45. 2004 Asociaciones Colombianas de Gastroenterología, Endoscopia digestiva, Coloproctología y Hepatología**
URL	http://www.gastrocol.org/pdf/Revista/vol19n3/supl/caso-ninadols.PDF
ABSTRACT	La visión del niño con virus de la hepatitis C (VHC) es muy diferente a la del adulto ya que sus características fisiopatólogicas y la evolución de la enfermedad son diferentes. Existen tres características esenciales diferentes: en primer lugar es una patología de espectro variable y cronicidad indefinida cuyos factores de riesgo para la cirrosis no se conocen como en el adulto, y su evolución puede variar desde una hepatitis crónica de bajo grado a la falla hepática o el hepatocarcinoma; en segundo lugar, no es posible predecir cuándo empieza la fibrosis y la progresión de la misma, el estado temprano dela enfermedad y el pronóstico; finalmente, la respuesta al tratamiento, la biodisponibilidad y los efectos secundarios de los medicamentos son diferentes a los del adulto.

AUTHOR(S)	**Rolando J. Ortega**
TITLE	**Historia natural de la hepatitis C**
PUBLICATION	**Rev Colomb Gastroenterol 19 (3 Supl) 2004**
URL	
ABSTRACT	La coinfección con el VIH aumenta rápidamente la progresión hacia la cirrosis acortando el tiempo de aparición a 7 años en promedio. Así mismo, la coinfección con el virus de la hepatitis

	B, podría acelerar la evolución a la cronicidad.

Global Prevalence

AUTHOR(S)	**M J Alter**
TITLE	**Epidemiology of hepatitis C**
PUBLICATION	Hepatology **Volume 26, Issue S3 , Pages 62S - 65S, 2002**
URL	
ABSTRACT	In the United States, the annual number of newly acquired acute hepatitis C virus (HCV) infections has declined from an estimated 180,000 in the mid 1980s to an estimated 28,000 in 1995. Approximately 25% to 30% of these infections are clinically apparent cases that are sufficiently symptomatic to gain medical attention. Deaths from fulminant hepatitis C are rare. The prevalence of antibody to HCV (anti- HCV) in the general population of the United States is 1.8%, corresponding to an estimated 3.9 million Americans infected with HCV, and an estimated 8,000 to 10,000 deaths each year result from HCV-associated chronic liver disease. HCV infection affects persons of all ages, but most acute cases of hepatitis C and the highest prevalence of anti-HCV are found among young adults. The highest proportion both of incident cases and prevalent infections is among whites, but the highest incidence and prevalence rates are among non-white racial/ethnic groups. In the past, transfusion of blood and blood products was an important source of HCV transmission, but currently, high-risk drug and sexual exposures account for most HCV transmission. Although the incidence of acute hepatitis C has declined, there is a large reservoir of chronically infected Americans who can serve as a source of transmission to others and who are at risk of the severe consequences of chronic liver disease.

AUTHOR(S)	**Butt AA.**
TITLE	**Hepatitis C virus infection: the new global epidemic.**
PUBLICATION	**Expert Rev Anti Infect Ther. 2005 Apr;3(2):241-9**
URL	
ABSTRACT	Hepatitis C virus infects an estimated 170 million people worldwide. It is a major cause of liver cirrhosis, end-stage liver disease and hepatocellular carcinoma. It is also a leading cause of liver transplant in the USA. The virus is primarily transmitted parenterally, but there is significant mother-to-child transmission. Partly due to the virus's genetic diversity, it evades the host

	immune response and it has been difficult to identify candidate vaccines. However, significant advances have been made in the treatment of chronic hepatitis C virus infection. Currently, the combination of pegylated interferon-alpha and ribavirin is the standard treatment for chronic hepatitis C virus infection, and leads to long-term eradication of the virus in approximately 54% of people. Treatment response is dependent on the infecting genotype, with 76 to 80% of those with genotypes 2 and 3, but only approximately 40% with genotype 1 or 4 achieving a sustained virologic response. Since treatment is expensive and associated with significant adverse effects, more effective strategies for the prevention of transmission are needed, especially in resource-limited countries, where the burden of disease is the highest.

AUTHOR(S)	**Dr. J. Frankish, G. Moulton, B. Kwan, M. Doyle Waters, D. Milligan, Dr. T. Buller-Taylor**
TITLE	**Hepatitis C Prevention: An Examination of Current International Evidence**
PUBLICATION	**Public Health Agency of Canada, 2002.. Cat. No.: H39-606/2002-1E** **ISBN: 0-662-31800-5**
URL	http://www.phac-aspc.gc.ca/hepc/hepatitis_c/pdf/hepcPrevention/index.html#1
ABSTRACT	This report examines the available evidence regarding the prevention of the spread of the hepatitis C virus (HCV)a. First, it examines prevention strategies and lessons learned from an evidence-based perspective in developed countries that would be useful to the Canadian context. Second, the paper considers what Canada could undertake strategically from the international experience in the short and long term. The latter includes a review of key papers and identification of key issues, gaps and opportunities, and strategic directions for inclusion in an eventual action plan on hepatitis C prevention.

AUTHOR(S)	**European Association for the Study of the Liver (EASL)**
TITLE	**What Are the Public Health Implications of Hepatitis C?**
PUBLICATION	**Journal of Hepatology 1999;** 30**: 956–961**
URL	http://www.snfge.asso.fr/00-Commun/pdf/hepatite_c_a.pdf
ABSTRACT	Hepatitis C is a major health problem. The global prevalence of chronic hepatitis C is estimated to average 3% (ranging from 0.1

	to 5% in different countries): there are some 150 million chronic HCV carriers throughout the world, of whom an estimated 4 million are in the USA and 5 million in Western Europe. The prevalence seems to be higher in Eastern Europe than in Western Europe. In industrialized countries, HCV accounts for 20% of cases of acute hepatitis, 70% of cases of chronic hepatitis, 40% of cases of end-stage cirrhosis, 60% of cases hepatocellular carcinoma and 30% of liver transplants. The incidence of new symptomatic infections has been estimated to be 1 - 3 cases/100,000 persons annually. The actual incidence of new infections is obviously much higher (the majority of cases being asymptomatic). The incidence is declining for two reasons: (a) transmission by blood products has been reduced to near zero; (b) universal precautions have markedly reduced transmission in medical settings. Intravenous drug use remains the main mode of transmission; but, even here, the rate of transmission is diminishing due to a heightened awareness of the risk of needle sharing and, in some countries, the availability of needle-exchange programs.

AUTHOR(S)	**Hauri AM, Armstrong GL, Hutin YJ**
TITLE	**The global burden of disease attributable to contaminated injections given in health care settings.**
PUBLICATION	**Int J STD AIDS. 2004 Jan;15(1):7-16.**
URL	
ABSTRACT	As part of the 2000 Global Burden of Disease study, we quantified the death and disability from injection-associated infections with hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). We modelled the fraction of incident infections attributable to health care injections in the year 2000 on the basis of the annual number of injections, the proportion of injections administered with reused equipment, the probability of transmission following percutaneous exposure, the prevalence of active infection, the prevalence of immunity and the total incidence. Infections in 2000 were converted into disability-adjusted life years (DALYs) in 2000-2030 using natural history parameters, background mortality, duration of disease, disability weights, age weights and a 3% discount rate. Four Global Burden of Disease regions where reuse of injection equipment in the absence of sterilization was negligible were excluded from the analysis. In the remaining 10 regions, in 2000,

	persons received an average of 3.4 injections per year, 39.3% of which were given with reused equipment. In 2000, contaminated injections caused an estimated 21 million HBV infections, two million HCV infections and 260,000 HIV infections, accounting for 32%, 40% and 5%, respectively, of new infections for a burden of 9,177,679 DALYs between 2000 and 2030. Injection overuse and unsafe practices account for a substantial burden of death and disability worldwide. There is a need for policies and plans for the safe and appropriate use of injections in countries where practices are poor.

AUTHOR(S)	**Lucas Wiessing; Dagmar Hedrich; Colin Taylor; Paul Griffiths.**
TITLE	**Hepatitis C: A hidden epidemic A major challenge to public health**
PUBLICATION	**Drugs in focus. Vol 11 European Monitoring Centre for Drugs and Drug Addiction, 2003.**
URL	http://www.emcdda.eu.int/?nnodeid=439
ABSTRACT	Over the past few years hepatitis C has emerged as a major threat to public health worldwide. Within the European Union the total number of people infected is unknown but it is likely to exceed one million and could be considerably higher. Since the introduction of screening of blood and blood products for hepatitis C, transmission of the virus has been dramatically reduced. Injecting drug users are now the group at greatest risk of infection, accounting for up to 60–90 % of new infections.

AUTHOR(S)	**Ramadori G, Meier V**
TITLE	**Hepatitis C virus infection: 10 years after the discovery of the virus.**
PUBLICATION	**Eur J Gastroenterol Hepatol. 2001 May;13(5):465-71**
URL	
ABSTRACT	The hepatitis C virus (HCV) causes an acute but very often chronic liver disease. An estimated 3% of the world population is chronically infected with HCV. Chronic hepatitis C is the major cause of cirrhosis and hepatocellular carcinoma (HCC), which most often lead to liver transplantation. HCV is a single-stranded enveloped RNA virus; it belongs to the flaviviridae family. The virus has been classified into six genotypes, some of which are

	distributed worldwide, others of which are confined to more restricted areas. The genotype is an independent predictor of response to antiviral treatment. Blood transfusion was a major risk factor for acquiring HCV infection before donor screening for surrogate marker testing for non-A, non-B (NANB) hepatitis began in the mid-1980s, followed by screening for antibody to HCV in 1990. Today, intravenous drug use and high-risk sexual activity are the most frequently identified risk factors associated with HCV infection. The prevalence of people with unknown HCV infection worldwide is high, so it is necessary to screen people with risk factors. The treatment of patients with chronic HCV infection who have not been treated previously should consist of interferon alpha (IFN-alpha) and ribavirin.

AUTHOR(S)	**The Global Burden Of Hepatitis C Working Group.**
TITLE	**Global burden of disease (GBD) for hepatitis C.**
PUBLICATION	**J Clin Pharmacol. 2004 Jan;44(1):20-9.**
URL	
ABSTRACT	Hepatitis C virus (HCV) infection is now a global public health issue. However, the global burden of disease attributable to HCV infection is unknown. The objectives of this WHO informal consultation included the following: (1) defining a strategy to estimate the global burden of disease (GBD) associated with HCV infection in terms of morbidity and mortality, (2) describing the natural history of HCV infection in terms of morbidity and mortality, and (3) identifying areas for which more research is needed. The GBD project is an attempt to examine all causes of morbidity and mortality using an approach common to all conditions. The World Health Organization (WHO) already has estimated the burden of disease associated with hepatitis B virus (HBV) infection and is now about to conduct the same analysis for HCV infection. A review has been conducted to estimate the prevalence of HCV infection by age, gender, and region. These figures can be used to estimate incidence, although there are a number of areas of uncertainty. Combined with natural history parameters, incidence estimates could be used to estimate the future burden due to current infections. However, the present model is not validated and requires calibration before it can be used. A consensus was reached over the strategies to be used to (1) estimate the current burden due to past infections and (2) estimate the future burden due to current infections. Provisional expert consensus was reached over natural history parameters and cofactors that influence them. However, systematic literature reviews and meta-analysis are preferable for obtaining estimates

	to be included in models. Areas deserving future research include (1) obtaining a better estimate of HCV infection prevalence by age groups, (2) characterizing the various morbidity states associated with HCV infection and their disability weights, (3) understanding the long-term natural history of HCV infection beyond 20 years after infection, and (4) estimating the prevalence (and numbers of) of HCV infection among the drug-using population worldwide. A working group was created to address unmet needs and to assist the WHO in estimating the GBD associated with HCV infection.

AUTHOR(S)	**Wasley A, Alter MJ.**
TITLE	**Epidemiology of hepatitis C: geographic differences and temporal trends.**
PUBLICATION	**Semin Liver Dis. 2000;20(1):1-16.**
URL	
ABSTRACT	Hepatitis C Virus (HCV) infection appears to be endemic in most parts of the world, with an estimated overall prevalence of 3%. However, there is considerable geographic and temporal variation in the incidence and prevalence of HCV infection. Using age-specific prevalence data, at least three distinct transmission patterns can be identified. In countries with the first pattern (e.g., United States, Australia), most infections are found among persons 30-49 years old, indicating that the risk for HCV infection was greatest in the relatively recent past (10-30 years ago) and primarily affected young adults. In countries with the second pattern (e.g., Japan, Italy), most infections are found among older persons, consistent with the risk for HCV infection having been greatest in the distant past. In countries with the third pattern (e.g., Egypt), high rates of infection are observed in all age groups, indicating an ongoing high risk for acquiring HCV infection. In countries with the first pattern, injection drug use has been the predominant risk factor for HCV infection, whereas in those with the second or third patterns, unsafe injections and contaminated equipment used in healthcare-related procedures appear to have played a predominant role in transmission. Much of the variability between regions can be explained by the frequency and extent to which different risk factors have contributed to the transmission of HCV. Because different strategies are required to interrupt different patterns of HCV transmission, determining the epidemiology of HCV infection in areas where that information has not yet been assessed is critical for developing appropriate prevention programs.

Prevalence Asia

AUTHOR(S)	**Kao JH, Chen DS**
TITLE	**Transmission of hepatitis C virus in Asia: past and present perspectives.**
PUBLICATION	**J Gastroenterol Hepatol. 2000 May;15 Suppl:E91-6.**
URL	
ABSTRACT	Hepatitis C virus (HCV) infection is a major public health problem. The epidemiology of HCV infection in different parts of Asia is similar, with an average seroprevalence of hepatitis C antibody (anti-HCV) less than 2.5% in healthy adults. The infection is rarely seen in children. The major routes of HCV transmission in Asia during the past few decades have been through administration of therapeutic blood products and injecting drug use, similar to the pattern observed in other parts of the world. However, obvious parenteral routes of transmission only account for 30-60% of anti-HCV-positive cases, depending on the geographic area. Other inapparent parenteral or per-mucosal exposures, including medical intervention, tattooing, acupuncture, vertical and sexual transmission, accidental needlestick and household contact, are also possible routes of HCV transmission. Although screening of blood donors for anti-HCV and improvements in infection control have significantly decreased the exposure to HCV, it is believed that HCV is still spreading in some areas of Asia because of the lack of routine screening of donated blood, injecting drug usage, traditional medicine practices or medical treatment under suboptimal hygienic conditions that involve blood contamination, and tattooing. Accordingly, until effective and safe immunoprophylaxis is available, interruption of transmission routes, such as implementation of blood donor screening for anti-HCV, adequate sterilization of surgical instruments or the use of disposable medical instruments, especially needles and syringes, and avoidance of sharing personal grooming aids remains the mainstay to prevent HCV infection in Asia today.

Korea

AUTHOR(S)	**Shin HR**
TITLE	**Epidemiology of hepatitis C virus in Korea.**
PUBLICATION	Intervirology. 2006;49(1-2):18-22.

URL	
ABSTRACT	Mortality due to liver cancer in Korea ranks as one of the highest in the world. Both hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are high-risk factors for liver cancer. Although HBV is by far the more important risk factor for the development of hepatocellular carcinoma (HCC) in Korea, HCV infection is more closely associated with HCC in elderly patients. Therefore, the evaluation of risk factors for HCV infection, including blood transfusion, is important. This study reviews the literature on HCV prevalence and risk factors among the general population, as well as the distribution of HCV genotypes in Korea. An overall estimate of the prevalence of anti-HCV among Koreans older than 40 years was 1.29% (95% confidence interval 1.12-1.48) during 1995-2000. Blood transfusion was the strongest risk factor for transmission of HCV infection. Risk factors for HCV infection in Korea other than blood transfusion and history of acupuncture have not been proven. The most prevalent HCV genotype is 1b followed by 2a. Even though the prevalence of anti-HCV in Korea has been reduced and the risk of HCV transmission through blood transfusion has markedly decreased, public-health programs to prevent de novo infections should be developed. Moreover, most people infected with HCV in Korea are older than 40 years, and therefore, the surveillance of adults (> or =40 years) for HCV infection will be helpful in early detection of HCC developing in them.

China

AUTHOR(S)	**Mingdong Zhang, Xiu-Di Sun, Steven D. Mark, Wen Chen, Lara Wong, Sanford M. Dawsey, You-Lin Qiao, Joseph F. Fraumeni, Jr., Philip R. Taylor, and Thomas R. O'Brien.**
TITLE	**Hepatitis C Virus Infection, Linxian, China**
PUBLICATION	**Emerg Infect Dis 2005 Jan 21**
URL	http://www.cdc.gov/ncidod/EID/vol11no01/03-1005.htm
ABSTRACT	Bloodborne viruses may have spread in rural China during the past 25 years, but population-based prevalence estimates are lacking. We examined the frequency of hepatitis C virus (HCV) and HIV type 1 (HIV-1) among residents of Linxian, a rural community in Henan Province. In 2000, blood was collected from participants (>55 years of age) who had enrolled in a population-based nutritional intervention trial in 1985. We randomly selected 500 participants for HCV testing and 200 participants for HIV-1 testing. For HCV, 48 (9.6%) of 500 participants were positive by enzyme immunoassay and recombinant immunoblot assay (95% confidence interval, 7.0%–12.2%), and prevalence was lowest in the most geographically isolated participants. Among the HCV-infected participants, 42 had a specimen available from 1985, of

	which 16 (38.1%) were positive for HCV. For HIV-1, 0/200 participants were positive. We conclude that HCV is now a common infection among older adults in Linxian, China.

AUTHOR(S)	**Fan WM, Zhu WF, Yin LM, Wei L, Xu XY, Zhuang H.**
TITLE	**Prospective study in 142 cases of hepatitis C virus infection.**
PUBLICATION	**World J Gastroenterol 2004; 10(19): 2867-2869**
URL	http://www.wjgnet.com/1007-9327/10/2867.asp
ABSTRACT	AIM: There is limited information on the natural history of HCV infection in China. We investigated the outcome of HCV infection after nine-year follow-up and the risk factors in blood donors in China in order to provide the foundation for prevention and therapy. METHODS: A total of 172 cases of HCV infection with anti-HCV positive and ALT abnormality were enrolled in the archives when was screened blood in Hebei Province in 1993. In them 142 blood donors were followed up till July 2002. No antiviral treatment was applied to them during the period of infection. In the present study, anti-HCV, HCV-RNA and aminotransferase were detected and genotyping was conducted by the method of restriction fragment length polymorphism(RFLP). B-type ultrasound detection was performed in all the patients. Age, sex, alcohol consumption and clinical symptoms were questioned. RESULTS: After nine years' follow-up, 10.56% (15/142) of the cases were negative for anti-HCV and 16.42% (12/134) of them were negative for HCV-RNA. The genotypes 1b, 2a and 1b/2a were 91.07%, 6.25% and 2.68% respectively. Twelve cases (8.45%) were negative for both HCV RNA and anti-HCV. The rate of chronicity in this group was 83.58% (112/134), and the rate of viral spontaneous resolution was 16.42% (22/134). The mean level of ALT, AST, gamma-GT in HCV RNA positive cases was significantly higher than that in HCV RNA negative cases ($P<0.001$). The abnormal rate of ALT and/or AST in male donors was significantly higher than that in female donors ($P = 0.005$). The rate of progression to liver cirrhosis from chronic hepatitis C was significantly higher in the cases of super-infection with HBV than that in the cases of single HCV infection. Overdose alcohol consumption promoted the progression to chronicity. CONCLUSION: This area (Hebei Province) has a higher rate of chronicity in HCV infection, and measures should be taken to prevent its progression to serious liver diseases, especially for patients super-infected with HCV and HBV.

Hong Kong

AUTHOR(S)	**Leung N, Chu C, Tam JS.**
TITLE	**Viral hepatitis C in Hong Kong.**
PUBLICATION	**Intervirology. 2006;49(1-2):23-7.**
URL	
ABSTRACT	OBJECTIVE: Hepatitis C virus (HCV) infection can lead to serious liver disease. Its medico-socio-economic burden on society can be immense. This study investigates the epidemiology of HCV infection in Hong Kong. METHODS: Data from the Department of Health, relevant publications from Medline search and data from two acute hospitals were reviewed. RESULTS: The prevalence of anti-HCV among voluntary blood donors is stable, remaining at approximately 0.035-0.099% over the past 10 years, and is higher in the older age group. Among the high-risk groups, the anti-HCV prevalence is as follows: (1) hospital patients 0.8%, (2) intravenous drug users 46.0%, (3) patients infected with HIV 7.9%, (4) children with transfusion-dependent hematologic disease 16.3%, (5) patients on continuous ambulatory peritoneal dialysis 1.8%, patients on hemodialysis 16.4%, recipients of kidney transplants 6.2% and (6) patients with hepatocellular carcinoma 7.3%. Among blood donors, 58.8% were infected with HCV genotype 1b and 27.0% with genotype 6a. Genotype 6a is particularly common among intravenous drug users. CONCLUSION: Hong Kong has a low prevalence of HCV infection. Patients are mostly infected through transfusion with blood or products prior to the introduction of anti-HCV screening to the blood transfusion service. Illicit drug use constitutes another significant risk. Since 1997, there has been a great increase in population movement between China and Hong Kong which might affect the epidemiology of HCV infection.

India

AUTHOR(S)	**Jain A, Rana SS, Chakravarty P, Gupta RK, Murthy NS, Nath MC, Gururaja S, Chaturvedi N, Verma U, Kar P.**
TITLE	**The prevalence of hepatitis C virus antibodies among the voluntary blood donors of New Delhi, India.**
PUBLICATION	Eur J Epidemiol. 2003;18(7):695-7.
URL	
ABSTRACT	Infection with hepatitis C virus (HCV) is a major cause of transfusion-associated hepatitis, cirrhosis and hepatocellular carcinoma. The present study was conducted with an objective

	to evaluate the prevalence of anti-HCV antibody in New Delhi, India using a large number of healthy voluntary blood donors. A total of 15,898 healthy voluntary blood donors were subjected to anti-HCV testing (using a commercially available third generation anti-HCV ELISA kit) and 249 were found to be reactive for anti-HCV antibody, yielding an overall prevalence of 1.57%. No significant difference was found between the HCV positivity rate of male (1.57%; 238/15,152) vs. female (1.47%; 11/746) donors, family (1.58%; 213/13,521) vs. altruistic (1.51%; 36/2377) donors and first-time (1.55%; 180/11,605) vs. repeat (1.61%; 69/4293) donors. The age distribution of anti-HCV reactivity showed a maximum prevalence rate of 1.8% in the age group of 20-29 years. In addition, there was a clear trend of decreasing positivity for anti-HCV with increasing age and this trend was statistically significant. The results of the present study show that the prevalence of anti-HCV antibodies in the healthy voluntary blood donors of New Delhi, India is considerably higher than the reported seroprevalence of HCV in majority of the industrialized nations and this represents a large reservoir of infection capable of inflicting significant disease burden on the society. In addition, donors of New Delhi, India showed a trend of decreasing seroprevalence with increasing age, possibly implying a higher exposure rate to HCV in younger subjects.

AUTHOR(S)	**Chowdhury A, Santra A, Chaudhuri S, Dhali GK, Chaudhuri S, Maity SG, Naik TN, Bhattacharya SK, Mazumder DN.**
TITLE	**Hepatitis C virus infection in the general population: a community-based study in West Bengal, India.**
PUBLICATION	**Hepatology. 2003 Apr;37(4):802-9.**
URL	
ABSTRACT	Limited information is available about the prevalence and genotype distribution of hepatitis C virus (HCV) in the general population of India. A community-based epidemiologic study was carried out in a district in West Bengal, India. By a 1:3 sampling method, 3,579 individuals were preselected from 10,737 inhabitants of 9 villages of the district, of whom 2,973 (83.1%) agreed to participate. Twenty-six subjects (0.87%) were HCV antibody positive. The prevalence increased from 0.31% in subjects <10 years of age to 1.85% in those >or=60 years. No difference in prevalence between men and women was observed. Serum alanine aminotransferase (ALT) levels were elevated in 30.8% (8 of 26) of anti-HCV-positive subjects compared with 3.2% (94 of 2,947) anti-HCV-negative subjects (P <.001). HCV RNA was detectable in 80.8% (95% CI, 65.6%-95.91%) of the anti-HCV-positive subjects by reverse

	transcription-primed polymerase chain reaction (RT-PCR). The participants were HCV types 1b in 2 (9.5%), 3a in 8 (38.1%), 3b in 6 (28.6%), and unclassified in 5 (23.8%). Nucleotide sequencing and phylogenetic analysis assigned the unclassified type to genotype 3e. In conclusion, this study provides general population-based estimates of HCV prevalence, including genotypes, from a South Asian country. Although the prevalence of HCV infection in this population was lower than that reported from industrialized countries of the west, the total reservoir of infection is significant and calls for public health measures, including health education to limit the magnitude of the problem.

Thailand

AUTHOR(S)	**Ishida T, Takao S, Settheetham-Ishida W, Tiwawech D.**
TITLE	**Prevalence of hepatitis B and C virus infection in rural ethnic populations of Northern Thailand.**
PUBLICATION	J Clin Virol. 2002 Feb;24(1-2):31-5.
URL	
ABSTRACT	BACKGROUND: In Thailand, the population is composed of multiethnic stocks. However, many epidemiological studies on HBV and HCV have focused on blood donors with Thai and/or Chinese ethnic background. Available information on HBV and HCV infections among ethnic minorities in Thailand is limited. OBJECTIVE: So as to contribute to the local public health planning, we have conducted an ethno-epidemiological survey for the HBV and HCV infections among several minorities in a multiethnic center, Northern Thailand. STUDY DESIGN: A total of 658 individuals from seven ethnic groups, Lahu, Lisu, Shan, Red Karen, White Karen, Hmong and Akha, living in northern Thailand were studied for the prevalence of HBV and HCV infections by the use of particle agglutination tests. RESULTS: An overall prevalence of HBs-Ag, anti-HBs and anti-HCV in the seven groups was 10.3, 33.0 and 3.8%, respectively. The positivity rate of HBV and HCV infection in each tribe ranged 4.7% (Akha)-22.6% (Lahu) and 2.0% (Hmong and Akha)-8.1% (Shan), respectively. Sexual difference in the prevalence of HBV was not observed, whereas the prevalence of HCV was significantly higher in the males ($P<0.05$). The prevalence of HBV was significantly different ($P<0.005$) by the groups but that of HCV was not. CONCLUSIONS: The prevalence of HBV and HCV infection in Thai ethnic minorities was investigated. We demonstrated that HBV was a more common infectious agent found in this populations than HCV. The prevalence of HBV infection was different by tribe but not by sex. In contrast, the

	prevalence of HCV infection was not different by tribe but by sex (males were infected more than females). The present study showed that HBV and HCV infection are widely spread in rural ethnic populations of northern Thailand. Thus, a nation wide but community-base epidemiological survey is required for the public health planning to control their related serious diseases.

AUTHOR(S)	**Wiwanitkit V.**
TITLE	**Anti HCV seroprevalence among the voluntary blood donors in Thailand.**
PUBLICATION	Hematology. 2005 Oct;10(5):431-3.
URL	
ABSTRACT	Hepatitis C virus (HCV) infection is an increasing problem, affecting large numbers of the population in both the developed and the developing parts of the world. It is generally accepted as a significant public health problem with major associated morbidities and mortalities, in particular hepatocellular carcinoma. One of several strategies for prevention of HCV transmission is screening for anti HCV serology among donated blood in the blood bank. However, screening for HCV infection varies considerably throughout the world; differences between resource-poor and resource-rich countries are particularly pronounced. This is a particular problem in the developing countries in Asia where HCV infection has high prevalence, this is especially the case among the underprivileged populations and those countries are usually less able to afford routine HCV serological screening in blood bank. In Thailand, HCV infection is an important infectious disease. However, screening for anti HCV serology is performed in only a few large blood banks. The purpose of this study is to summarize the prevalence of Anti HCV seropositivity among the voluntary blood donors in the previous reports in Thailand. This review identified 5 reports in the literature reporting data in 39,633 documented voluntary donors. In all there were 541 cases with Anti HCV seropositivity. The summative percentage for Anti HCV seropositive was 1.37%. This rate is similar to the high levels reported previously from many other Asian countries, implying the importance of HCV infection in Asia. Thorough donor screening to eliminate high-risk donors is recommended to improve blood transfusion services in Thailand and other developing countries and screening for Anti HCV serology should be set as the national strategies covering all blood banks.

Prevalence Australia

AUTHOR(S)	**Amin J,Gidding HF, Gilbert GL, Backhouse J, Kaldor JM, Dore GJ, Burgess MA**
TITLE	**Hepatitis C prevalence — a nationwide serosurvey**
PUBLICATION	**Communicable Diseases Intelligence Vol 28 No 4, December 2004.**
URL	http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/cda-2004-cdi2804n.htm
ABSTRACT	Hepatitis C is the most commonly notified disease in Australia. In 1998 the Hepatitis C Virus Projections Working Group (HCPWG) estimated that there were approximately 210,000 people who had been infected by hepatitis C virus (HCV) in Australia by 2001. Population-based serosurveys are required to validate this estimate. Here we estimate HCV prevalence on the basis of HCV antibody seroprevalence in the Australian national serosurvey. Between 1996 and 1998, 2,800 sera opportunistically collected from pathology laboratories throughout Australia were tested for HCV antibody. National HCV notifications reported from 1991 through 1998 were also assessed. Eighty-one sera were HCV antibody positive, giving an age standardised prevalence of 2.3 per cent (95% CI 1.8%–2.9%). The 20–24 year age group had the highest HCV prevalence, 5.3 per cent (95%CI 3.3%–8.1%) and the male to female ratio was 1.8:1.0. Approximately 111,000 HCV notifications were received from 1991 through 1998. HCV prevalence estimated by the serosurvey is approximately three times higher than cumulative HCV notifications. Age and sex distributions of seroprevalence are broadly consistent with cumulative notification data. These distributions are consistent with the majority of HCV infections in Australia being transmitted by injecting drug use. Very low age specific seroprevalence estimates in the over 50 years age group indicate that there is not a large pool of undiagnosed infection in this age group. The serosurvey provides an estimate of Australian HCV prevalence and baseline data to determine incidence trends, both of which are required for health-care planning. Commun Dis Intell 2004;28:517–521.

AUTHOR(S)	**Australian National Council on AIDS, Hepatitis C and Related Diseases** **Hepatitis C Sub-Committee** **Hepatitis C Virus Projections Working Group:**
TITLE	**Estimates and Projections of the Hepatitis C Virus Epidemic**

	in Australia 2002
PUBLICATION	**National Centre in HIV Epidemiology and Clinical Research The University of New South Wales August 2002**
URL	http://www.ancahrd.org/pubs/pdfs/epidemic_02.pdf
ABSTRACT	In Australia to the end of 2000, over 160,000 diagnoses of hepatitis C virus (HCV) were reported to State and Territory surveillance systems. Of annual total notifications to the National Notifiable Diseases Surveillance System between 1991 and 2000, around 65% of HCV diagnoses were in the age range 20-39, with approximately 35% of all diagnoses in women. Studies of HCV risk factors in Australia indicate that the vast majority, around 80%, of prevalent HCV infections were through injecting drug use. In injecting drugs users (IDUs), HCV prevalence ranged from 50% to 70% since the early 1970s. HCV incidence among IDUs in the 1980s and early 1990s has been estimated to be around 15% per year, with some evidence of a decline in HCV incidence in the late 1980s, but stable during the mid-to late-1990s. Among people who develop HCV antibodies following exposure to HCV, around 75% develop chronic infection, remaining infectious and at risk of long-term sequelae of their infection. A previous systematic review of published studies estimated that of all people chronically infected with HCV, around 7% would develop cirrhosis after 20 years following exposure. Rates of liver failure and hepatocellular carcinoma (HCC) following cirrhosis were taken to be 4% and 1% per annum respectively. A mathematical model of the HCV epidemic in Australia estimated that there were around 210,000 people living with HCV antibodies in Australia in 2001 (plausible range 157,000 to 252,000). HCV incidence in 2001 was estimated to be 16,000 new infections (11,000 to 19,000), 91% of whom were exposed through injecting drugs.

Prevalence Africa

Sub/Saharan Africa

AUTHOR(S)	**Madhava V, Burgess C, Drucker E.**
TITLE	**Epidemiology of chronic hepatitis C virus infection in sub-Saharan Africa.**
PUBLICATION	Lancet Infect Dis. 2002 May;2(5):293-302.

URL	
ABSTRACT	Hepatitis C virus (HCV) is a major cause of chronic liver disease in the world. The WHO estimates that 3% (170 million) of the world's population are chronically infected with HCV. Sub-Saharan Africa is of great interest because it is reported to have the highest HCV prevalence rate (5.3%), and a concurrent HIV epidemic. In our review of the published literature we found consistent evidence of high HCV prevalence in many countries of Africa. We estimate the overall prevalence of HCV in Sub-Saharan Africa is 3.0%. The central African region has the highest estimated prevalence of 6%, west Africa has an estimated prevalence of 2.4%, and southern and east Africa with the lowest estimated prevalence of 1.6%. Given low sexual transmission of HCV and infrequency of intravenous drug use in Sub-Saharan Africa, iatrogenic causes of HCV transmission need to be further evaluated.

Abidjan

AUTHOR(S)	**Rouet F, Chaix ML, Inwoley A, Msellati P, Viho I, Combe P, Leroy V, Dabis F, Rouzioux C; ANRS 1236 DITRAME-B&C Study Group.**
TITLE	**HBV and HCV prevalence and viraemia in HIV-positive and HIV-negative pregnant women in Abidjan, Cote d'Ivoire: the ANRS 1236 study.**
PUBLICATION	J Med Virol. 2004 Sep;74(1):34-40
URL	
ABSTRACT	A retrospective survey estimating the prevalence of hepatitis viruses B (HBV) and C (HCV) was conducted on samples taken in 1,002 African pregnant women (501 diagnosed as HIV-1 positive and 501 HIV-1 negative) participating in a clinical trial program conducted in Abidjan, Cote d'Ivoire (West Africa). Hepatitis B markers studied were HBs antigen (HBsAg), and if positive, HBe antigen/anti-HBe antibodies and HBV DNA. Two third generation (G3) HCV enzyme immunoassays (EIAs) were used for primary HCV screening. All anti-HCV antibody-positive sera were assessed further with supplementary assays (one another G3 EIA, RIBA 3.0, and HCV RNA). HCV genotypes were also determined. HBsAg was found in a similar proportion among HIV-positive (45/499, 9.0%, 95% confidence interval [95% CI], 6.6-11.9) and HIV-negative (40/498, 8.0%, 95% CI, 5.8-10.8) women (P = 0.58). The diagnosis of chronic hepatitis B, based on HBV DNA positive results, was more frequent in HIV-positive

	women (26.7%), compared to HIV-negative women (9.4%) (P = 0.06). In the case of hepatitis C infection, after supplementary testing allowing the elimination of frequent false-positive screening results, a prevalence rate of about 1% was found, both in HIV-positive (6/501, 1.2%, 95% CI, 0.44-2.59) and HIV-negative (4/501, 0.8%, 95% CI, 0.22-2.03) women (P = 0.53). Of the 10 samples confirmed positive and assessed for HCV RNA, eight (80%) were viraemic and belonged to HCV genotypes 1 or 2. The relative high frequency of HIV/HBV coinfection in Cote d'Ivoire emphasises the need for monitoring the risk of hepatotoxicity by antiretroviral therapy in such patients. We propose an accurate and cost-efficient algorithm for HCV diagnosis in Africa.

Burkina Faso

AUTHOR(S)	Koumpingnin, K. , Ouagadougou 12, CNTS Burkina-Faso Co-author(s) Kientega, Y. , Ouagadougou, CNTS Domo, Y. , Ouagadougou, CNTS Ky, L. , Ouagadougou, CNTS Sourabie, D. , Ouagadougou, CNTS Kienou, K. , Ouagadougou, CNTS Lamizana, L. , Ouagadougou, CNTS
TITLE	Situation of blood transfusion in a developing country: need for an in-depth reform of the practices in BURKINA FASO (WEST AFRICA)
PUBLICATION	XVI REGIONAL CONGRESS, OF THE INTERNATIONAL SOCIETY OF BLOOD TRANSFUSION
URL	http://isbt-web.org/bangkok/abstract.php
ABSTRACT	The analysis shows some deficiencies in the whole transfusion chain. Donor's recruitment and management: only the second blood bank of the country succeeds in avoiding blood from family members. Apart from that, 56 to 100% of transfused blood units are from the patient's family members. The absence or insufficiency of the pre-donation selection of blood donors was noticed with sometimes the non-exclusion of the HIV positive donors compromising the transfusion safety. Blood components production: Whole blood is the main blood product available. Biological qualification: only HIV and Ag HBs tests are systematic. As for the VHC whose prevalence goes from 2 to 4.5% it is detected only from time to time.

Congo

AUTHOR(S)	**Laurent C, Henzel D, Mulanga-Kabeya C, Maertens G, Larouze B, Delaporte E.**
TITLE	**Seroepidemiological survey of hepatitis C virus among commercial sex workers and pregnant women in Kinshasa, Democratic Republic of Congo.**
PUBLICATION	Int J Epidemiol. 2001 Aug;30(4):872-7.
URL	
ABSTRACT	BACKGROUND: Studies conducted mainly in industrialized countries have shown that the transmission of hepatitis C virus (HCV) is mainly parenteral, and have emphasized the role of nosocomial transmission. In Equatorial Africa, the respective contributions of parenteral and non-parenteral routes of transmission are unknown. The potential role of sexual transmission in this area of high HCV endemicity, where sexually transmitted infections (STI) are frequent, is suggested by the fact that HCV infection is rare in infants and young adolescents, but increases thereafter with age. The present study, conducted in Democratic Republic of Congo, was designed to determine the prevalence of HCV infection and associated sexual risk factors in two female populations with different sexual behaviour. METHODS: Cross-sectional studies conducted among commercial sex workers (CSW; n = 1144) and pregnant women (n = 1092) in the late 1980s in Kinshasa showed a high frequency of at-risk sexual behaviour, STI and human immunodeficiency virus (HIV) infection, particularly among CSW. We screened samples collected during these epidemiological studies for antibodies to HCV using a second-generation ELISA with confirmation by a third-generation LIA. We also assessed sociodemographic variables, medical history, STI markers and sexual behaviour, and their potential association with HCV infection. RESULTS: The overall prevalence of anti-HCV was 6.6% (95% CI : 5.2-8.2) among CSW and 4.3% (95% CI : 3.2-5.7) among pregnant women (age-adjusted OR = 1.5, 95% CI : 1.0-2.1, P = 0.05). Multivariate analysis showed that the presence of anti-HCV among CSW was independently associated with a previous history of blood transfusion ($P < 0.001$), age >30 years ($P < 0.001$) and the presence of at least one biological marker of STI ($P < 0.03$). No such links were

	found among pregnant women (although the history of blood transfusions was not investigated in this group). Anti-HCV was not associated with sociodemographic variables or sexual behaviour in either group, or with individual markers of STI. Despite the high-risk sexual behaviour and the higher prevalence of STI in CSW, the difference in HCV seroprevalence between CSW and pregnant women (6.6% versus 4.3%) was small, particularly when compared with the difference in the seroprevalence of HIV (34.1% versus 2.8%). CONCLUSION: The role of sexual transmission in the spread of HCV seems to be limited. Parenteral transmission (including blood transfusion and injections), possibly related to the treatment of STI, probably plays a major role.

Senegal

AUTHOR(S)	**Mbaye PS, Renaudineau Y, Diallo A, Haudrechy D, Sane M, Michel G, Raphenon G, Klotz F.**
TITLE	**Hepatitis C virus and chronic hepatopathies in Dakar: case-control study [Article in French]**
PUBLICATION	Med Trop (Mars). 2000;60(1):47-52.
URL	
ABSTRACT	In Black Africa, the role of hepatitis C virus (HCV) in the onset of chronic hepatic disease is unclear. This is particularly true in Senegal where the prevalence of HCV is moderate. To gain insight into this question, a case-control study including 73 patients and 73 controls was carried out at Principal Hospital in Dakar in 1995. The patients included in this study presented chronic hepatitis in 2 cases cirrhosis in 25 and hepatocellular carcinoma in 46. Patients and controls underwent serologic testing for HCV (ELISA screening test followed by 3rd generation ELISA test in case of positive results and confirmation by immunoblot) with determination of HCV serotype using the immunoenzymatic method. Testing also included research for infection by hepatitis B virus and for anti-delta antibodies. Anti-HCV antibodies were detected in two patients (3 p. 100) and serology was suspicious in two others. Serotype 2 was detected in one of these patients. No positive results were recorded in controls. Fifty-four patients (74 p. 100) and 15 controls (21 p. 100) presented the HBs antigen including 13 patients (24 p. 100) and I control (7 p. 100) with anti-delta antibodies. This study shows that HCV currently plays a minor role in the onset of hepatic disease in hospitalized patients in Senegal. It also confirms the predominant role of hepatitis B and complicating effect of the delta hepatitis virus. These findings are compared

	with reported data for Black African countries. The impact of HCV appears to be lower in Senegal than in central Africa.

AUTHOR(S)	**Mejri S, Salah AB, Triki H, Alaya NB, Djebbi A, Dellagi K.**
TITLE	**Contrasting patterns of hepatitis C virus infection in two regions from Tunisia**
PUBLICATION	**J Med Virol. 2005 Jun;76(2):185-93.**
URL	
ABSTRACT	This report is a population-based study describing the pattern of hepatitis C virus (HCV) infection in two distinct regions in Tunisia. The study included a total of 11,507 individuals sampled in 1996 from both genders, all age groups, urban and rural settings belonging to 2,973 families. HCV infection was assessed by commercial enzyme immunoassay (EIA) and immunoblot assays and detection of HCV RNA by PCR. HCV genotypes and subtypes were determined by sequencing in the 5'-untranslated region (UTR) viral genomic region and the INNO-LiPA HCVII genotyping kit. Genetic relatedness between HCV strains was assessed by sequencing of a portion of the NS5B region. HCV prevalence was significantly higher in the North-Western region than in the Southern one: 1.7% versus 0.2% (P < 10(-3), chi(2) = 8,506). There was no difference in positivity according to gender or living in rural or urban settings; the only significant risk factor was advanced age. HCV prevalence among household contacts of HCV positives was not significantly higher than the prevalence in the whole study population. These results indicate a heterogeneity in the geographical distribution of HCV in Tunisia. An increased HCV transmission occurs in the North-Western region with large predominance of genotype 1b (88%) and low contribution of intrafamilial transmission.

Zimbawe

AUTHOR(S)	**Seroprevalence of hepatitis C virus infection among indigent urban pregnant women in Zimbabwe.**
TITLE	**Cent Afr J Med. 2000 Jan;46(1):1-4.**
PUBLICATION	**Madzime S, William MA, Mohamed K, October T, Adem M, Mudzamiri S, Woelk GB.**
URL	
ABSTRACT	OBJECTIVE: To estimate the seroprevalence of hepatitis C virus (HCV) infection among indigent pregnant women. DESIGN: A serological survey study of indigent pregnant women admitted for labour and delivery. SETTING: Harare Maternity Hospital,

	Harare, Zimbabwe. SUBJECTS: A random sample of 1,607 women, delivering at the hospital during the study period agreed to participate in the research. Serum samples were available for 1,591 women. MAIN OUTCOME MEASURES: Serum samples were tested for the presence of antibodies to HCV using a second generation agglutination assay and a third generation enzyme immuno-assay (EIA). RESULTS: Of the 1,591 women tested 25 (1.6%) were anti-HCV positive (95% confidence interval 1.0% to 2.2%). The frequency of anti-HCV positives was associated with maternal age (p = 0.0202) and maternal syphilis status (p = 0.020). Gravidas aged 25 to 29 years had the highest anti-HCV seroprevalence (3.4%) as compared with gravidas of other age categories (1.0% to 1.5%). Women with serologic evidence of syphilis infection during the index pregnancy had an increased prevalence of anti-HCV as compared with those women without evidence of syphilis infection (7.9% versus 1.4%, p = 0.020). There was some evidence (p = 0.094) that a positive prior history of delivering a stillborn infant was also associated with an increased prevalence of anti-HCV (4.1% vs 1.4%). Other maternal characteristics, including hepatitis B virus carriage status, parity, and whether she had received prenatal care during the index pregnancy were not determinants of maternal anti-HCV status. CONCLUSIONS: Overall, hepatitis C antibody was detected in 1.6% of indigent women delivering at Harare Maternity Hospital. This proportion of anti-HCV positive pregnant women is similar to estimates published for North American and European women. Factors positively associated with maternal seropositivity in our population included maternal age (between 25 to 29 years), prior history of delivering a stillborn infant, and seropositivity for syphilis during the index pregnancy. Given the relatively low seroprevalence of HCV and the fact that risk factors for HCV infection remain largely unknown, more studies are needed to identify high risk populations likely to benefit from HCV screening and treatment programmes.

Gambia

AUTHOR(S)	**Mboto CI, Davies-Russell A, Fielder M, Jewell AP.**
TITLE	**Hepatitis C antibodies in asymptomatic first-time blood donors in The Gambia: prevalence and risk factors.**
PUBLICATION	**Br J Biomed Sci. 2005;62(2):89-91.**
URL	
ABSTRACT	This study evaluates the seroprevalence and risk factors for hepatitis C (HCV) antibodies in asymptomatic first-time blood donors in The Gambia. The study population includes 460 blood donors (age range: 18-40 years [mean: 27.5]) who attended the

	Royal Victoria Teaching Hospital from July to December 2002. Antibodies to hepatitis C are determined using and enzyme-linked immunosorbent assay (ELISA) test system. The prevalence of hepatitis C found in this study was 1.1% (95% CI, 0.16-1.12). Previous history of sexually transmitted disease, married men in polygamous relationships, and hospital or clinic-based workers were determined to be at risk of acquiring hepatitis C. The study shows that seroprevalence of hepatitis C in The Gambia is low compared to other countries in the region.

Prevalence Latin America

Argentina

AUTHOR(S)	**Rodolfo Valtuille, José Luis Fernández, Noemí del Pino, Leonardo Lef, José Berridi, Héctor Moretto, Pablo Rendo**
TITLE	**Virus de la Hepatitis C en Pacientes de una Unidad de Hemodiálisis**
PUBLICATION	**Rev. Nefrol. Diál. y Transpl., N°42 - Abril 1997, Pág. 9-22**
URL	
ABSTRACT	Según las comunicaciones sobre 1 103 pacientes de 26 centros, presentadas en los dos últimos Congresos Argentinos de Nefrología (15, 16), la prevalencia en nuestro país es 50.8 %, (rango 16. 7 % a 78.9 %), cifra que contrasta significativamente con el 0.86 % de los dadores voluntarios de sangre.

Bolivia

AUTHOR(S)	**Gandolfo GM, Ferri GM, Conti L, Antenucci A, Marrone R, Frasca AM, Vitelli G.**
TITLE	**[Prevalence of infections by hepatitis A, B, C and E viruses in two different socioeconomic groups of children from Santa Cruz, Bolivia] [Article in Spanish]**
PUBLICATION	**Med Clin (Barc). 2003 May 24;120(19):725-7.**
URL	
ABSTRACT	BACKGROUND AND OBJECTIVES: The epidemiology of hepatitis A, E, B and C was analyzed in 1,393 children living in Santa Cruz de la Sierra, Bolivia. They were distributed in two groups according to the social condition. MATERIALS AND METHOD: 1,393 children were selected from two different

	schools: one attended by children belonging to a high social class of the town (group A), and the other school attended by children belonging to the poorest social class (group B). Blood samples were drawn by a team of physicians from Rome University La Sapienza. Serum antibodies against hepatitis A, B, C and E virus, and the hepatitis B surface antigen were evaluated by immunometric methods.The significance was evaluated using the *2 test. RESULTS: Antibodies against hepatitis A virus were detected in 82% of examined children, with a significant difference between the two groups (56.3% vs 94.8%). The incidence of anti-HBc antibodies increased with age, so the infection is acquired prevalently in adolescence with a significant difference between both groups (1.1% vs 3.8%). The same phenomenon was observed with anti-HCV antibodies (4.7% positivity only in group B). Serum antibodies against hepatitis E virus were observed in 1.7% cases. CONCLUSIONS: In Bolivia, as in other developing countries, viral hepatitis represents a serious burden for public health. Spreading of viral hepatitis can be controlled upon improving hygienic conditions and customs. Moreover, a vaccination plan against hepatitis A and B virus is necessary for the population living in endemic areas.

AUTHOR(S)	**Leon P, Venegas E, Bengoechea L, Rojas E, Lopez JA, Elola C, Echevarria JM.**
TITLE	**Prevalence of infections by hepatitis B, C, D and E viruses in Bolivia**
PUBLICATION	**Revista panamericana de Salud Publica 5(3) 1999. pp. 144-151**
URL	
ABSTRACT	In Bolivia, no studies have been carried out specifically on hepatitis viruses. Thus, their prevalence and circulation patterns are virtually unknown. A seroepidemiologic study was performed from 1992 to 1996 to generate a preliminary idea of the overall prevalence of infection from hepatitis B, C, D, and E viruses (HBV, HCV, HDV, and HEV, respectively) in different Bolivian population groups. Prompted by the data obtained in other areas of Latin America, the study focused on indigenous communities in the Amazon region. In rural areas of the high Andean plateau, HBV infection showed an overall prevalence compatible with medium to low endemicity (11.2%), and no carriers of HCV or HDV antibodies were found. In two high-risk groups in the city of Cochabamba (homeless children and sexual workers), the prevalence of HBV infection was similar (11.6%) and could be considered low by comparison to that of similar population groups in Latin American urban centers. The prevalence of HCV (one positive case, or 0.5%) was similar to that found in similar

	population groups, although the small number of samples precludes drawing more definite conclusions. As has been noted previously with similar communities in tropical areas of South America, HBV infection is highly endemic in indigenous populations of the Bolivian Amazon (with an overall prevalence of 74.0%), but circulation of HCV has not been detected. It is a well-known fact that HBV is horizontally transmitted and that transmission can take place very early in life, but the mechanisms involved are unknown. By 10 years of age, more than half the population has already had the natural infection that, in approximately 10 more years will have affected virtually the entire population. The very low rate of positivity to HBsAg (1.6%), the absence of viral DNA in samples showing isolated positivity to anti-HBc, and the high prevalence of anti-HBs among individuals who show markers for natural infection (92.4%) suggest vertical transmission plays no role in persistent endemicity. So far, no outbreak of HDV infection has been documented in these communities, but the high endemicity shown by HBV points to the possibility of future outbreaks. Results obtained with tests for the detection of antibodies against HEV suggest that this virus is circulating widely in Bolivia and that it could have caused recent outbreaks in Cochabamba state. Vaccination against HBV in endemic populations is recommended as a short-term measure. Also recommended are actively searching for outbreaks and sporadic cases of hepatitis E in the entire country and performing additional research that will help in assessing the public health consequences of the situation described in this article.

Brazil

AUTHOR(S)	**Barbosa AP, Martins RM, Teles SA, Silva SA, Oliveira JM, Yoshida CF.**
TITLE	**Prevalence of hepatitis C Virus infection among hemophiliacs in Central Brazil.**
PUBLICATION	Mem Inst Oswaldo Cruz. 2002 Jul;97(5):643-4. Epub 2002 Aug 30.
URL	
ABSTRACT	In order to investigate the hepatitis C virus (HCV) infection prevalence and risk factors in hemophiliacs in Central Brazil, 90 patients were interviewed and serum samples tested for HCV RNA and anti-HCV antibodies. An overall prevalence of 63.3% (CI 95%: 53.0-72.7) was found. Multivariate analysis of risk factors showed that number of blood transfusions was significantly associated with this infection. Most hemophiliacs received locally produced cryoprecipitate. All infected patients

	were transfused before the screening of blood units for anti-HCV. However, hemophiliacs who received exclusively screened cryoprecipitate were HCV negative. It confirms the expected decline in transfusion-acquired hepatitis C.

Chile

AUTHOR(S)	**Gonzalez R, Soza A, Hernandez V, Perez RM, Alvarez M, Morales A, Arellano M, Riquelme A, Viviani P, Covarrubias C, Arrese M, Miquel JF, Nervi F.**
TITLE	**Incidence and prevalence of hepatitis C virus infection in Chile.**
PUBLICATION	Ann Hepatol. 2005 Apr-Jun;4(2):127-30.
URL	
ABSTRACT	Chronic hepatitis C is a major cause of liver-related morbidity and mortality. Epidemiological data regarding this infection in developing countries is scanty. METHODS: Prevalence of hepatitis C (HCV) infection was investigated in a random sample of Chilean general adult population older than 20 years of age. Additionally, frequency of HCV infection was assessed in group of native Chilean Amerindians (Mapuche Indians) living in an isolated locality of the Southern Chile. Incidence of HCV infection was estimated using serum samples separated by 7 years (1993-2000). RESULTS: Among 959 subjects, prevalence of anti-HCV antibodies was 1.15% (95% CI 0.48-1.82%) and 0.83% when only RIBA-confirmed cases were considered. Among these subjects, 62.5% had detectable HCV RNA in serum and 40% of them had a history of blood transfusion. Age distribution of cases showed a steadily increasing prevalence with age. Estimated incidence of new HCV infections was 15 per 100,000 subjects per year in the period 1993-2000. No cases were detected among the 145 Mapuche subjects studied. CONCLUSIONS: HCV infection is a prevalent disease in the Hispanic population of Chile with a low incidence in the last decade, whereas it was not detected in an isolated Mapuche Indian community. Age distribution of prevalence suggests that the peak of infection in Chile occurred 30 to 50 years ago.

Colombia

AUTHOR(S)	**Alvaro Hoyos, Nora Vanegas, Erika Páez. Medellín**
TITLE	**Epidemiología de la Hepatitis C en Colombia**
PUBLICATION	**Acta Medica Colombiana, Vol. 27 No. 4, Julio-Agosto 2002.**

URL	http://www.actamedica.com/ anterior.htm
ABSTRACT	Los virus del VIH y VHC son muy similares. Tienen una banda única de ARN como genoma, altos niveles de replicación viral, causan infección crónica subclínica que puede persistir por muchos años y comparten iguales rutas de transmisión. – presentan similitudes epidemiologicas.

Cuba

AUTHOR(S)	**Neninger Vinageras, Elia, Velbes Marquetti, Pedro y Del Castillo Carrillo**
TITLE	**Concepción. Incidencia de infección por el virus de la hepatitis B y C.**
PUBLICATION	**Rev cubana med. [online]. ene.-mar. 2001, vol.40, no.1 citado 30 Noviembre 2005], p.24-29**
URL	http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75232001000100004&lng=es&nrm=iso&tlng=es
ABSTRACT	Se sabe que los pacientes con tumores malignos y tratamiento con citostáticos se encuentran expuestos a sufrir infecciones virales por el uso frecuente de la vía parenteral. En este estudio se analizó la frecuencia de la hepatitis B y C en pacientes sometidos a tratamiento. Se estudiaron 336 pacientes con diferentes localizaciones tumorales, en los que se analizaron las características serológicas y clínicas de los infestados. Se pesquisó la infección viral mediante marcadores serológicos Umelisa HbsAg y HVC. Se determinaron los valores sanguíneos de alaninoaminotransferasa, aspartatoaminotransfera y bilirrubina. Se realizó biopsia hepática percutánea. Se encontró que el 3,27 % de los pacientes contrajo la infección con predominio de infección por el virus B. Se conoció que todos los pacientes habían sido sometidos a tratamiento quirúrgico y que el tiempo de tratamiento con quimioterapia fue entre 4 y 15 meses. Se hallaron como principales factores de riesgo: las intervenciones quirúrgicas, el acceso parenteral frecuente y las transfusiones sanguíneas. El signo clínico más evidenciado fue la hepatomegalia. Los resultados muestran una baja incidencia de infección viral B y C. Se señaló la importancia de realizar el pesquisaje de virus B y C en pacientes sometidos a quimioterapia que presenten elevación de las enzimas hepáticas.

AUTHOR(S)	**Dr. Domingo Sabina Molina,1 Dr. Francisco García Valdés,2 Dr. Álvaro Asconegui Moya2 y Dr. Orelvis Martínez López3**
TITLE	**Características epidemiológicas de la hepatitis C en donantes de sangre**

PUBLICATION	**Rev Cub Hig y Epi (3)2002**
URL	http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S0253-17512002000300009&lng=es&nrm=iso&tlng=en
ABSTRACT	A case-control study (60 and 120, respectively) of blood donors from the Provincial Blood Bank of Cienfuegos was conducted. The cases were those identified as positive in the test for detecting antibodies against hepatitis C virus (HCV), whereas the controls were the selected donors with negative test (third generation ELISA test). The prevalence of risk factors for acquiring hepatitis C was estimated in blood donors and the force of association between risk factors and the appearance of infection caused by HCV was measured. It was proved that the risk variables with the highest odd ratio values (with statistical significance) were the received transfusions, the parental treatments and the sexually transmitted diseases history. It was found a high prevalence of asthma among HCV seropositive patients (23 %), which may be related to the way of percutaneous transmission by repeated parental treatments.

Mexico

AUTHOR(S)	**Mendez-Sanchez N, Ponciano-Rodriguez G, Chavez-Tapia NC, Motola-Kuba D, Almeda-Valdes P, Sanchez-Lara K, Ramos MH, Uribe M**
TITLE	**Prevalence of hepatitis C infection in a population of asymptomatic people in a checkup unit in Mexico City.**
PUBLICATION	**Dig Dis Sci. 2005 Apr;50(4):733-7.**
URL	
ABSTRACT	Hepatitis C virus (HCV) infection has an estimated prevalence of 3% around the world. Unfortunately, many persons with HCV infection are asymptomatic. The aim of this study was to determine the prevalence of hepatitis C Virus infection in asymptomatic persons. This study was carried out in a population-based cross-sectional study in the Checkup Unit of University Hospital in Mexico City. Patients with two or more HCV risk factors were studied. Serum specimens from all patients were screened for HCV RNA by qualitative polymerase chain reaction (PCR). HCV RNA-positive serum was also screened by quantitative PCR and for HCV genotype. Three hundred asymptomatic people were included, 194 men and 106 women, with a mean age of 46.8+/-11.9. Six (2%) of the 300 people were positive and viremic. The most common risk factors in positive patients were manicures or pedicures with a nonpersonal instrument and more than three sexual partners. We concluded that hepatitis C is frequent in asymptomatic people, and those people are often viremic. In addition, this study suggests that the spectrum of liver disease in

	asymptomatic and newly diagnosed HCV-positive persons is broad.

AUTHOR(S)	**Jesús fernando guerrero-romero, m.c.,(1) antonio castañeda, m.c.,(2) Martha rodríguez-morán, m.c.**
TITLE	**Prevalencia y factores de riesgo Asociados a hepatitis "C" en donadores de sangre En el municipio de Durango, México**
PUBLICATION	**Salud Publica Mex 1996;38:94-100.**
URL	
ABSTRACT	OBJECTIVE. To determine the prevalence of anti-viral hepatitis C antibodies (HCV-Ab+) in voluntary blood donors and to identify the main risk factors associated with it. MATERIAL AND METHODS. A case-control study was conducted over a 20-month period beginning in June 1993. A clinical history was obtained from all blood donors seen at the Centro Estatal de la Transfusion Sanguinea (State Blood Transfusion Center) and the Instituto Mexicano del Seguro Social in Durango, Mexico. HCV-Ab+ was determined in 5 915 serum assays using the second generation enzymatic immunoassay (UBI HCV EIA). RESULTS. The prevalence of HCV-Ab+ was 1.47 per 100 donors. The HCV-Ab+ prevalence was similar for urban and rural donors (1.54% and 1.34%) with no history of work migration. The main risk factors associated with HCV were a history of transfusions, (odds ratio -OR- 14.80, 95% confidence interval -CI-4.97-47.17) and sexual promiscuity or intercourse with prostitutes, (OR 6.53, 95% CI 2.61-16.54). CONCLUSIONS. The high prevalence of HCV-Ab+ may be explained by the lack of epidemiological surveillance of the population at risk. These data underscore the need for routine screening of HCV-Ab among voluntary blood donors and male or female prostitutes.

Uruguay

AUTHOR(S)	**Ismael A. Conti Díaz**
TITLE	**Enfermedades emergentes y re emergentes en Uruguay.**
PUBLICATION	**Revista Medica del Uruguay Rev Med Uruguay 2001; 17: 180-199**
URL	http://publicaciones.smu.org.uy/publicaciones//rmu/2001v3/art6.pdf
ABSTRACT	El trabajo analiza en primer término el concepto de enfermedades emergentes y reemergentes siguiendo los criterios de la Organización Mundial de la Salud, diferenciándolas de las enfermedades por gérmenes oportunistas con las que son a

	veces confundidas, su etiopatogenia general con los numerosos factores condicionantes, su enorme repercusión sobre la salud de la población a nivel universal y el gran impacto socioeconómico concomitante. Especial énfasis es puesto en aspectos epidemiológicos y de prevención y control de las mismas en Uruguay, analizándose la situación actual de cada una de ellas sean de naturaleza vírica, rickettsial, bacteriana o parasitaria, como asimismo el problema de Aedes aegypti como vector reemergente en 1997. En el caso del VIH-SIDA se señala su tremenda importancia sanitaria y social a nivel local y universal, así como la frecuencia de diferentes enfermedades oportunistas, en particular micóticas y parasitarias, causas directas de muerte de los pacientes. Además de la tuberculosis, otras enfermedades, como la sarna, la ediculosis y la leptospirosis, han reemergido en el país. Varias enfermedades infecciosas nuevas con sus respectivos agentes etiológicos han sido diagnosticadas últimamente entre nosotros. Entre otras, el síndrome pulmonar por hantavirus en 1997, la rickettsiosis por Rickettsia conorii en 1990 (primeros casos autóctonos en el continente americano), la microsporidiosis por Enterocytozoon bieneusi en 2000, la ciclosporiasis por Cyclospora cayetanensis también en 2000 y la criptosporidiosis por Cryptosporidium parvum en 1987. Se comentan asimismo afecciones con posibilidad de reemerger en el país como el cólera y el dengue y otras cuya presencia e incidencia al presente vienen siendo investigadas, como la enfermedad de Lyme o la legionelosis. También la parmacorresistencia en patógenos de primera línea como Streptococcus pneumoniae es comentada en detalle. Las principales medidas de prevención y control de estas afecciones, proclamadas por la Organización Panamericana de la Salud para la región de las Américas, son resumidas, con mención especial de lo actuado en tal sentido a nivel nacional.

Venezuela

AUTHOR(S)	**Aguilar MS, Cosson C, Loureiro CL, Devesa M, Martinez J, Villegas L, Flores J, Ludert JE, Alarcon de Noya B, Noya O, Liprandi F, Pujol FH.**
TITLE	**Prevalence of infection with hepatitis C virus in Venezuela, as assessed with an immuno-assay based on synthetic peptides.**
PUBLICATION	Ann Trop Med Parasitol. 2001 Mar;95(2):187-95.
URL	

ABSTRACT	Information on infection with hepatitis C virus (HCV) in South America is scarce. The seroprevalences of antibodies to HCV among urban, rural and Amerindian populations from Venezuela, and the genotypes of the HCV isolates recovered, were therefore determined. A total of 2592 sera were tested with an immuno-assay which was developed in-house and based on synthetic peptides. Each reactive sample was then re-tested, using other enzyme immuno-assays and a reverse-transcription, nested PCR, and any sample confirmed positive (in any test) was considered HCV-positive. Genotypes were determined by analysis of RFLP. Overall, 39 (1.5%) of the samples were found HCV positive. The results of the immuno-assays indicated that the seroprevalence of HCV markers among the Amerindians investigated (23/1082, or 2.1%) was significantly higher than that among the other subjects (16/1510, or 1.1%; P = 0.02). No such difference was observed in the numbers of subjects confirmed positive by PCR, however (6/1082 v. 10/1510), and some of the anti-HCV reactivity observed among Amerindians may have been the result of cross-reactivity with parasitic infections. The relative low prevalence of active HCV infection (16/2582, or 0.6%) and the HCV genotypes observed (mainly genotype 1) are in agreement with the results of previous studies indicating that HCV is not autochthonous to South America. However, it is clear that the virus may now be found even in isolated Amerindian populations. The in-house, synthetic-peptide-based immuno-assay seems to be a valuable tool for epidemiological studies.

AUTHOR(S)	**Muller G, Zabaleta M, Caldera LH, Bianco N, Machado IV.**
TITLE	**Hepatitis C in Venezuela. Preliminary report**
PUBLICATION	**G E N. 1990 Oct-Dec;44(4):336-42.**
URL	
ABSTRACT	Five hundred serum samples from volunteers blood donors were investigated in order to determine the presence of anti-HCV antibodies by an enzyme-linked immunoassay recently developed worldwide. Prevalence of true-positive samples was 1.2% (6/500), 2 fold higher than the reported prevalence in most of the industrialized countries. From these 6 sera, one (16.6%) showed simultaneous reactivity for HBV anticore antibody. Three sera (25%) from 12 patients with diagnosis of Non-A Non-B hepatitis were reactive for anti-HCV antibodies while in a group of 32 sera with negative HAV and HBV screening, 4 (12.5%) showed anti-HCV antibodies. Two samples out of 16 sera persistently positive for anticore demonstrated the presence of anti-HCV antibodies. The anti-HCV antibodies were undetectable in two cases of autoimmune chronic hepatitis. Our results indicate that in Venezuela, HCV represents a significant problem

	of public health coexisting in certain cases with HBV infection.

AUTHOR(S)	**CAMEJO, María I, MATA, Gloria and DIAZ, Marcos.**
TITLE	**Prevalence of hepatitis B, hepatitis C and syphilis in female sex workers in Venezuela.**
PUBLICATION	**Rev. Saúde Pública, June 2003, vol.37, no.3, p.339-344. ISSN 0034-8910.**
URL	
ABSTRACT	OBJECTIVE: In Venezuela, female sex workers are submitted to a preventive control of syphilis and human immunodeficiency virus (HIV). However, other very important sexually transmitted infections are not evaluated. A study was carried out to identify the sociocultural background of a group of sex workers and its association with the seroprevalence of hepatitis B and C markers, in addition to routine evaluation. METHOD: A total of 212 female sex workers who attended the control center of sexually transmitted infections (STI) in the city of Los Teques, Venezuela, were evaluated. Women were asked their age, educational background, use of contraceptive methods and condoms. Blood was drawn to determine the prevalence of syphilis, hepatitis B surface antigen (HBsAg), antibodies to hepatitis B core (anti-HBc), hepatitis C (anti-HCV) and HIV. RESULTS: The prevalence of syphilis was 2.4%, seroprevalence of anti-HCV was 0.5%, HBsAg 3.8% and anti-HBc 13.8%. No cases of HIV were observed. Higher prevalence of hepatitis B markers was associated with a lower level of education ($p<0.05$) and higher age ($p<0.05$). It was found that 38.5% of participant women never used condoms and 25.6% did not use any contraceptive method. CONCLUSION: It could be necessary to implement preventive programs to immunize sex workers against hepatitis B virus as well as education programs on condom use for their protection against sexually transmitted infections.

AUTHOR(S)	**Muller G, Zabaleta M, Caldera LH, Bianco N, Machado IV.**
TITLE	**Hepatitis C in Venezuela Preliminary report.**
PUBLICATION	**G E N 1990;44:336-42**
URL	
ABSTRACT	Five hundred serum samples from volunteers blood donors were investigated in order to determine the presence of anti-HCV antibodies. Prevalence of true-positive samples was 1.2%. Our results indicate that in Venezuela, HCV represents a significant problem of public health coexisting in certain cases with HBV infection

Middle East

Egypt

AUTHOR(S)	**Arafa N, Hoseiny ME, Rekacewicz C, Bakr I, El-Kafrawy S, Daly ME, Aoun S, Marzouk D, Mohamed MK, Fontanet A.**
TITLE	**Changing pattern of hepatitis C virus spread in rural areas of Egypt.**
PUBLICATION	J Hepatol. 2005 Sep;43(3):418-24.
URL	
ABSTRACT	BACKGROUND/AIMS: To identify patterns of HCV spread in the Nile Delta of Egypt. METHODS: Residents in a Nile Delta village were invited to participate in a cohort study of HCV infection. Risk factors for past or current infection were identified at cohort intake using generalized estimated equations models. Attributable fractions were calculated for all independent risk factors. RESULTS: The prevalence of HCV antibodies increased from 2.7% in those <20 years of age to more than 40% in males aged 40-54 years. The peak in HCV prevalence in the 40-54 year age group corresponds to the aging of the cohort of children infected through schistosomiasis intravenous treatments in the 1960s-70s (accounting for 12.4% of all HCV infections observed today among adults). Following this initial founding event, the HCV epidemic has spread in the community through iatrogenic factors, and particularly injections (37.9% of the overall attributable fraction in adults). In children, however, no iatrogenic factors were associated with increased risk of infection, suggesting a change in the pattern of HCV spread. CONCLUSIONS: While HCV infections in adults could be attributed to iatrogenic factors, and particularly injections, infections in children could not be explained by similar routes of transmission.

AUTHOR(S)	**el-Sadawy M, Ragab H, el-Toukhy H, el-Mor Ael-L, Mangoud AM, Eissa MH, Afefy AF, el-Shorbagy E, Ibrahem IA, Mahrous S, Abdel-Monem A, Sabee EI, Ismail A, Morsy TA, Etewa S, Nor Edin E, Mostafa Y, Abouel-Magd Y, Hassan MI, Lakouz K, Abdel-Aziz K, el-Hady G, Saber M.**
TITLE	**Hepatitis C virus infection at Sharkia Governorate, Egypt: seroprevalence and associated risk factors.**
PUBLICATION	J Egypt Soc Parasitol. 2004 Apr;34(1 Suppl):367-84.

URL	
ABSTRACT	Because many persons with chronic hepatitis C virus (HCV) infection are asymptomatic, population based serologic studies are needed to estimate the prevalence of infection and to develop and evaluate prevention efforts. A sample of 1422 individuals was included in the study by using multistage sampling technique. Their age ranged from 4-78 years with a mean age (34.7 +/- 18.5), 782 were males (55%) and 640 were females (45%). Exposures and demographic characteristics were obtained through a predesigned questionnaire. Antibody to HCV was assessed using micro-particle enzyme immunoassay (MEIA) enzyme assay by IMX, and the HCV RNA was tested by Real-time PCR technique using ABI Prism 7700 system. The seroprevalence of antibodies to HCV were 23.4% and 27.4% in urban and rural areas respectively, with an overall prevalence (25.8%). This reflects prior HCV infection but not necessarily a current liver disease. Prevalence was higher among males than females and increased sharply with age, from 4.8% in those < 20 years old to (41.9%) in older ages (> or = 40 years). Those who were not educated and farmers had a significantly high prevalence. The significant predictors of HCV infection were previous parenteral therapy for schistosomiasis (OR = 4.3, 95% CI = 3.6-7.9), among those over 20 years of age (3.5, 2.18-5.8), blood transfusion (4.1, 2.4-6.9), invasive procedures (surgery and endoscopy), and use of contaminated syringes and needles. Also, shaving at community barbers added significance to the model. Exposures not significantly related to HCV seropositivity were gender, active infection with Schistosoma mansoni, sutures or intravenous and urinary catheterization, water pipe "goza" smoking in group.

Lebanon

AUTHOR(S)	**Baddoura R, Haddad C, Germanos M**
TITLE	**Hepatitis B and C seroprevalence in the Lebanese population.**
PUBLICATION	East Mediterr Health J. 2002 Jan;8(1):150-6.
URL	
ABSTRACT	We aimed to evaluate exposure to hepatitis B and C viruses (HBV and HBC) and candidate risk factors among the Lebanese population. All individuals presenting to all laboratory units in the country over a 2-week period were asked for a 5-mL whole blood sample and answered a questionnaire addressing risk factors. For individuals under 15 years of age the mother was interviewed. In all, 2893 blood samples were examined. Refusal rate was 2.9%. Exposure to HBV antigen was 18.9%; 1.9% were carriers and acute hepatitis B point prevalence was 0.1%. Exposure to HCV antigen was 0.7%. Exposure to both HBc and

	HCV antibodies was 0.2%. HBc prevalence increased with age and was higher among men. Significant risk factors included blood transfusion, haemodialysis and gastrointestinal endoscopy.

Pakistan

AUTHOR(S)	**Khattak MF, Salamat N, Bhatti FA, Qureshi TZ.**
TITLE	**Seroprevalence of hepatitis B, C and HIV in blood donors in northern Pakistan.**
PUBLICATION	J Pak Med Assoc. 2002 Sep;52(9):398-402.
URL	
ABSTRACT	OBJECTIVE: To study the seroprevalence and trends of Hepatitis B, C and HIV sero markers in healthy blood donors of Northern Pakistan. SUBJECTS AND METHODS: Blood donated by healthy donors from both Armed Forces and civilian population, collected from Jan 1996 to Dec 2000 were tested by Enzyme Linked Immunoassay at Armed Forces Institute of Transfusion Rawalpindi, Pakistan. Demographic data of these donors was also studied. RESULTS: Of 103858 blood donors, 3.3% (95% CI 3.20%-3.41%) were HBsAg, 4.0% (95% CI 3.91%-4.11%) were anti HCV and 0.007% anti HIV positive. Their average was 28 years. HBsAg positive donors were a decade younger than anti HCV positive donors. Pattern in Armed Forces and civilians donors was similar but there was significant reduction in the prevalence of HBsAg carriage in all blood donors. CONCLUSION: This study supports the changing trends in HBV/HCV seroprevalence in blood donors and a low prevalence of HIV in Pakistani population.

AUTHOR(S)	**Akhtar S, Younus M, Adil S, Jafri SH, Hassan F**
TITLE	**Hepatitis C virus infection in asymptomatic male volunteer blood donors in Karachi, Pakistan.**
PUBLICATION	J Viral Hepat. 2004 Nov;11(6):527-35.
URL	
ABSTRACT	The objectives of this study were to assess the proportion of hepatitis C virus (HCV) reactors and to identify risk factors associated with HCV infection in volunteer blood donors in Karachi, Pakistan. Between 1 January 1998 and 31 December 2002, consecutive blood donations tested at two blood banks were used to assess the proportion of HCV sero-reactors donors. To evaluate the potential risk factors, a case-control study design was implemented to select cases and controls between 15 October 2001 and 15 March 2002. The overall

	seroprevalence of HCV in these blood donors was 1.8% (6349/35 1309). Trend analysis revealed a significant (P < 0.001) linear increase in proportions of HCV-seropositive donors from 1998 to 2002. Final multivariate logistic regression model showed that the cases were more likely than controls to have reported past hospitalization or to have received multiple injections. When a glass syringe was used to give therapeutic injections, it increased the adjusted odds of being HCV seropositive significantly more among cases than in controls and this relationship was stronger when injection was given by general medical practitioner than if the injection was given in hospital setting. Cases were more likely than controls to have reported sexual contact with multiple sexual partners. Primary prevention programmes focused on identified risk factors might help to curtail the spread of HCV infection in this community and in other similar settings in developing countries.

AUTHOR(S)	**Aslam M, Aslam J, Mitchell BD, Munir KM**
TITLE	**Association between smallpox vaccination and hepatitis C antibody positive serology in Pakistani volunteers.**
PUBLICATION	J Clin Gastroenterol. 2005 Mar;39(3):243-6.
URL	
ABSTRACT	GOALS: To determine whether the smallpox vaccination program has significantly contributed to the widespread prevalence of hepatitis C infection in Pakistan. BACKGROUND: Hepatitis C virus has become a worldwide pandemic and has especially devastated developing nations such as Pakistan. There continues to be an increase in fatalities due to hepatitis C-related cirrhosis in Pakistan. STUDY: We studied 523 volunteers in the city of Lahore to determine whether the smallpox vaccination program, which ran from 1964 to 1982 in Pakistan, may be responsible for the national surge in hepatitis C viral infection, perhaps because of repetitive use of vaccination devices without proper sterilization or to contaminated vaccine contents. RESULTS: There was a significantly higher likelihood of hepatitis C antibody seroprevalence in individuals vaccinated for smallpox versus nonvaccinated individuals (21.0% vs. 4.6%, P < 0.001, age-adjusted odds ratio, 3.39; 95% confidence interval, 1.36-8.46). Subjects with positive hepatitis C serology were also more likely to have a history of transfusions (19.2% vs. 9.0%, P = 0.01), but anti-HCV positive serology was not significantly associated with a history of surgery or dental procedures. Following adjustment for age, sex, and history of other conditions, including transfusion, the association between prior smallpox vaccination and hepatitis C antibody seroprevalence remained strong and highly significant (multivariate adjusted odds ratio, 6.11; 95% confidence interval,

	2.58-14.51). CONCLUSION: These results suggest that the widespread prevalence of hepatitis C infection in Pakistan may be an unintended consequence of the country's smallpox vaccination program and that blood transfusion is also a significant risk factor.

AUTHOR(S)	**Khokhar N, Gill ML, Malik GJ**
TITLE	**General seroprevalence of hepatitis C and hepatitis B virus infections in population.**
PUBLICATION	J Coll Physicians Surg Pak. 2004 Sep;14(9):534-6.
URL	
ABSTRACT	OBJECTIVE: To determine the prevalence of hepatitis C virus (HCV) and hepatitis B virus (HBV) infection by detection of anti-HCV and hepatitis B surface antigen (HbsAg) in general population of Pakistan. DESIGN: Observational. PLACE AND DURATION OF STUDY: Community clinic of Shifa International Hospital, Islamabad, from January 1998 to June 2004. MATERIALS AND METHODS: Sera of healthy adult individuals who presented for medical evaluation as a pre-employment criteria in the Gulf region were examined for presence of hepatitis B surface antigen and anti-HCV antibody. Alanine aminotransferase levels were also determined. RESULTS: A total of 47,538 individuals were examined. Out of these, 2528 (5.31%) were positive for anti-HCV and 1221 (2.56%) individuals had positive HBsAg. Hepatitis B surface antigen and anti-HCV both were found in 92 (0.19%) individuals. Mean age of subjects, positive for HCV antibody was 44 years and 40.5 years for HBV. Ninety-four percent individuals were males and 6% were females. Alanine aminotransferase (ALT) was normal in 56 % of subjects with positive HCV and 84% of individuals with HBV. CONCLUSION: This study which evaluated predominantly a healthy male population, showed a high seroprevalence of anti-HCV and average seroprevalence of hepatitis B virus infection. A large majority of these patients was young and had normal ALT.

Turkey

AUTHOR(S)	**Yildirim B, Tahan V, Ozaras R, Aytekin H, Mert A, Tabak F, Senturk H.**
TITLE	**Hepatitis C virus risk factors in the Turkish community.**
PUBLICATION	Dig Dis Sci. 2005 Dec;50(12):2352-5.
URL	
ABSTRACT	Hepatitis C virus (HCV) is the most common chronic blood-borne infection in the worldwide. This infection is often insidious and one-half of infected patients are asymptomatic. Determination of

	risk factors for HCV transmission is very important. The aim of this study was to assess the risk factors, transmission to spouses and children for HCV infection in Turkish population. One hundred and fifty-one patients with chronic hepatitis C and 151 control cases were investigated for the probable risk factors of HCV infection. Complete blood count, ALT, AST, albumin, prothrombin time, upper abdomen ultrasonography assessment and percutaneous liver biopsy (not for cirrhotics) were performed in all patients with chronic hepatitis C. Anti-HCV testing was done by using second-generation ELISA in 302 cases. Minor surgical operation ($p < 0.001$), major surgical operation ($p = 0.001$), blood transfusion ($p < 0.001$), multi-partner sex ($p < 0.05$), frequent dental therapy ($p < 0.05$), and dental extraction ($p < 0.001$) in patients with a chronic HCV infection were found to be higher than the control group. No significant difference was found in other risk factors. The rate of hepatitis C virus in index cases was found to be 1.8% in their spouses and 1.2% in their children. Our study showed that surgical operation, frequent dental therapy, dental extraction, multi-partner sex, and blood transmission are the main risk factors for HCV infection in Turkish community.

Prevalence North America

US

AUTHOR(S)	**Centers for Disease Control and Prevention. Atlanta, GA.**
TITLE	**Hepatitis Surveillance Report No. 60.**
PUBLICATION	**U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2005**
URL	http://www.cdc.gov/ncidod/diseases/hepatitis/resource/PDFs/hep_surveillance_60.pdf
ABSTRACT	Hepatitis Surveillance, No. 60 presents statistics and trends in viral hepatitis in the United States through 2003. This publication, which summarizes viral hepatitis case reports received from state health departments, is intended as a reference document for policy makers, program managers, health planners, researchers and others who are concerned with the public health implications of these diseases. Any comments and suggestions that would improve the usefulness of future publications are appreciated and should be

	sent to Chief, Surveillance Team, Division of Viral Hepatitis, Centers for Disease Control and Prevention, 1600 Clifton Road, Mailstop G37, Atlanta, GA 30333.

AUTHOR(S)	**Yalamanchili K, Saadeh S, Lepe R, Davis GL**
TITLE	**The prevalence of hepatitis C virus infection in Texas: implications for future health care.**
PUBLICATION	Proc (Bayl Univ Med Cent). 2005 Jan;18(1):3-6.
URL	http://www.pubmedcentral.gov/articlerender.fcgi?tool=pubmed&pubmedid=16200141
ABSTRACT	Chronic hepatitis C is often asymptomatic and undiagnosed yet can progress to liver failure or hepatocellular carcinoma. This study determined the prevalence of hepatitis C in Texas and estimated the progression of disease in this cohort. National Health and Nutrition Evaluation Survey III data on the national prevalence of an antibody to the hepatitis C virus were extrapolated to Texas using census data weighted for local characteristics. A Markov model estimated the progression of liver disease. Results showed that 387,395 Texans (1.79%) are infected with the hepatitis C virus. County prevalence varied from 1.25% to 2.63%, with higher rates concentrated along the US-Mexico border. However, most cases of infection were located near major Texas cities. The number of infected persons will decline in the future. However, the proportion of cases progressing to cirrhosis will increase, resulting in more complications such as liver failure and hepatocellular carcinoma. Thus, chronic hepatitis C is common in Texas and will result in an increase in complications of cirrhosis in coming years. The disease will tax health care facilities and transplant units in the state.

Prevalence Tropical Countries

AUTHOR(S)	**Debonne JM, Nicand E, Boutin JP, Carre D, Buisson Y.**
TITLE	**Hepatitis C in tropical areas [Article in French]**
PUBLICATION	Med Trop (Mars). 1999;59(4 Pt 2):508-16.
URL	
ABSTRACT	The tropical features of hepatitis C have not yet been fully elucidated due to the scarcity of data. However it has been estimated that two-thirds of the infected population lives in tropics. The most heavily affected regions are Africa, China, and southeast Asia with prevalence rates of 5.3, 3.0, and 2.4 p. 100 respectively. In several countries mostly in Africa, prevalence

	rates range from 5 to 10 p. 100 or higher. Age is a major risk factor for infection. The classic transmission modes, i.e., blood transfusion and intravenous drug use, do not account for these high prevalence rates. Another mechanism could be parenteral injection under unsafe conditions. The most widespread genotypes in tropical areas are genotypes 1, 2, and 3. Other genotypes can be encountered locally including genotype 4 in black Africa and Egypt, genotype 6 in southeast Asia, and genotypes 1 and 3 in India. The association of hepatitis C with chronic liver disease has been the focus of several studies, mainly in Africa. The seroprevalence of virus C ranges from 2 to 55 p. 100 in cases of chronic hepatitis or cirrhosis and from 0 to 47 p. 100 in cases of hepatocellular cancer. Hepatitis C could be the underlying cause of 33 to 50 p. 100 of chronic liver diseases not linked to virus B. It is observed more often in patients with chronic hepatitis or cirrhosis than cancer in which virus B is dominant. Infection by both virus is rare without liver disease but is more frequent in patients with cancer than chronic non-tumoral liver disease.

AUTHOR(S)	**Tibbs CJ.**
TITLE	Tropical aspects of viral hepatitis. Hepatitis C .
PUBLICATION	Trans R Soc Trop Med Hyg. 1997 Mar-Apr;91(2):121-4.
URL	
ABSTRACT	This paper reviews our current understanding of hepatitis C infection in tropical countries. Since its discovery in 1989, hepatitis C has been recognized as an important disease in many tropical countries. In Egypt the prevalence in some sections of the population may-exceed 20%. In most tropical areas, however, the epidemiology of hepatitis C infection is poorly defined. There are clear variations in the distribution of genotypes in different areas and this may be one of the factors which influence the natural history of infection in different regions of the world. Routes of infection in tropical countries are poorly defined, most carriers having no clear risk factors for infection. There is some speculation that inadequate sterilization of medical equipment may be a route of infection in some areas. A combination of factors may result in an increased risk of hepatocellular carcinoma developing in patients from the tropics infected with hepatitis C and the prognosis may be worse due to co-infection with hepatitis B and human immunodeficiency virus, both of which may lead to accelerated liver disease. Prospects for disease control are poor due to the difficulty of developing a vaccine to the virus.

Prevalence Amazon

AUTHOR(S)	**Echevarria JM, Leon P.**
TITLE	**Epidemiology of viruses causing chronic hepatitis among populations from the Amazon Basin and related ecosystems.**
PUBLICATION	**Cad Saude Publica. 2003 Nov-Dec;19(6):1583-91. Epub 2004 Mar 3.**
URL	
ABSTRACT	On the last twenty years, viral hepatitis has emerged as a serious problem in almost all the Amerindian communities studied in the Amazon Basin and in other Amazon-related ecological systems from the North and Center of South America. Studies performed on communities from Bolivia, Brazil, Colombia, Peru and Venezuela have shown a high endemicity of the hepatitis B virus (HBV) infection all over the region, which is frequently associated to a high prevalence of infection by hepatitis D virus among the chronic HBV carriers. Circulation of both agents responds mainly to horizontal virus transmission during childhood through mechanisms that are not fully understood. By contrast, infection by hepatitis C virus (HCV), which is present in all the urban areas of South America, is still very uncommon among them. At the moment, there is not data enough to evaluate properly the true incidence that such endemicity may have on the health of the populations affected. Since viral transmission might be operated by mechanisms that could not be acting in other areas of the World, it seems essential to investigate such mechanisms and to prevent the introduction of HCV into these populations, which consequences for health could be very serious.

Prevalence Europe

Belgium

AUTHOR(S)	**Mathei C, Robaeys G, van Damme P, Buntinx F, Verrando R.**
TITLE	**Prevalence of hepatitis C in drug users in Flanders: determinants and geographic differences.**
PUBLICATION	Epidemiol Infect. 2005 Feb;133(1):127-36.
URL	
ABSTRACT	The prevalence of hepatitis C and related risk factors in drug users were compared in two geographic regions in Belgium, the city of Antwerp and the mixed urban-rural area of Limburg. All 310 participants were surveyed and screened for hepatitis B,

	hepatitis C and HIV. Prevalence rates of anti-HCV, anti-HBc and anti-HIV were 71, 62 and 4% in Antwerp and 46, 21 and 0% in Limburg respectively. Injecting drug use, duration of injecting drug use, work as a commercial sex-worker, originating from Turkey or Northern Africa, marginalization and anti-HBc positivity were identified as independent predictors for hepatitis C infection. In this study an important difference in HCV seroprevalence among drug users in a methadone maintenance programme across two geographic regions in Belgium was demonstrated. This was explained not only by variations in drug-related risk behaviour, but also by differences in sexual risk behaviour and socio-economic status.

AUTHOR(S)	**Mathei C; Wollants E; Verbeeck J; Van Ranst M; Robaeys G; et al**
TITLE	**Molecular epidemiology of hepatitis C among drug users in Flanders, Belgium: association of genotype with clinical parameters and with sex- and drug-related risk behaviours.**
PUBLICATION	**Eur J Clin Microbiol Infect Dis. 2005 Aug; 24(8): 514-22**
URL	
ABSTRACT	The aim of this study was to determine the genotypic variation of hepatitis C among drug users in Flanders and to relate the distribution of genotypes to the characteristics of the population. Hepatitis C virus RNA (HCV-RNA) quantification and genotyping was performed on stored samples from 161 anti-HCV-positive injecting and non-injecting drug users. Information on sociodemographic status, drug-related risk behaviour and sexual risk behaviour was available for each drug user. HCV-RNA was present in 152 of 161 samples (94.4%). Genotype 1 was predominant (48.7%), followed by genotype 3 (41.2%), genotype 4 (8.8%) and genotype 2 (1.4%). In the multivariate analysis, lack of a history of injecting drug use was confirmed as a statistically significant predictor for infection with genotype 1. Predictors for infection with genotype 3 were the presence of anti-HBc antibodies and a history of injecting drug use. Being tattooed emerged as a statistically significant predictor for infection with genotype 4. The 94.4% prevalence of HCV-RNA among anti-HCV-positive drug users was considerably higher than the 54-86% chronicity rate found globally among HCV-infected patients. The results of this study suggest the existence of separate transmission networks for injecting drug users and non-injecting drug users. Finally, the results suggest that tattooing practices play a role in the spread of HCV among drug users.

France

AUTHOR(S)	**Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES)**
TITLE	**Depistage de l'hepatite C - Populations a depister et modalites du epistage Recommandations du comite d'experts Reuni par l'ANAES**
PUBLICATION	**Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES), janvier 2001**
URL	Available only online at : http://www.anaes.fr/anaes/Publications.nsf/wEdition/RA_LILF-4VYG4H
ABSTRACT	La contamination par le virus de l'hépatite C (VHC) nécessite le contact entre le sang d'un sujet infecté et le sang d'une personne indemne. Les causes principales de contamination sont la transfusion sanguine pratiquée avant 1992 et la toxicomanie par voie intraveineuse. Cependant, le contact avec le sang infecté est possible dans d'autres circonstances, en particulier nosocomiales (l'origine nosocomiale, même si elle est rarement démontrée, pourrait être actuellement en France la seconde cause de contamination après la toxicomanie). Dans ce contexte, la transmission du VHC a été décrite au cours de séances d'hémodialyse, ou après endoscopie digestive en cas de défaut de stérilisation du matériel.Hors de l'hôpital, le partage du petit matériel sans partage de la seringue en cas de toxicomanie intraveineuse, ou le partage de la paille en cas de toxicomanie pernasale ont pu être incriminés. Par extension, une contamination dans d'autres circonstances où existe un contact avec du sang infecté est possible sans avoir été démontrée : endoscopies autres que digestives, actes chirurgicaux sanglants, toxicomanie par voie pernasale, tatouage, piercing, soins dentaires, etc.

Italy

AUTHOR(S)	**Comandini UV, Tossini G, Longo MA, Ferri F, Cuzzi G, Noto P, Zaccarelli M, Visco G.**
TITLE	**Sporadic hepatitis C virus infection: a case-control study of transmission routes in a selected hospital sample of the general population in Italy.**
PUBLICATION	**Scand J Infect Dis. 1998;30(1):11-5.**

URL	
ABSTRACT	A case-control study was performed on 9,175 Italian adult outpatients in 5 hospitals in Rome. The study was carried out to clarify the role of some less investigated risk factors (RF) in the spread of hepatitis C virus (HCV) infection. All subjects were contacted by interviewers, who completed a questionnaire. Their sera were stored and subsequently tested for both HCV and hepatitis B virus core (HBc) antibodies. 365 subjects, positive for anti-HCV and anti-HBc-negative, and who had denied intravenous drug use (IDU) (cases) were compared with an equal number of suitable random controls negative for anti-HCV and anti-HBc. Gender, age and region of birth and residence were matched. The prevalence of 13 RFs were statistically compared by univariate and multivariate analysis. A positive anti-HCV test was significantly associated, by multivariate analysis with intravenous treatments and minor surgical procedures (both before 1975) ($p < 0.001$), blood transfusions (before 1991) ($p < 0.01$), diabetes ($p < 0.01$), and deliveries in hospital ($p < 0.05$) (both before 1975). After 1975 (1991 for transfusions), all associations lost their significance. Intra-familial (sexual and non sexual), occupational RFs and dental care were not significantly associated with the presence of anti-HCV. We suggest that non-disposable syringes, commonly used until 1975 in Italy for i.v. treatments, have been the major route for HCV transmission in Italy among non-IDU subjects.

AUTHOR(S)	**WHO Regional Office for Europe's Health Evidence Network (HEN)**
TITLE	**What is the evidence for the effectiveness of interventions to reduce hepatitis C infection and the associated morbidity?**
PUBLICATION	**WHO Regional Office for Europe , April 2005**
URL	http://www.euro.who.int/document/E86159.pdf
ABSTRACT	This is a Health Evidence Network (HEN) synthesis report on effective interventions to reduce hepatitis C infection. Prevalence is most common among injecting drug user populations, where up to 98% can be infected despite a low HIV prevalence. Interventions are needed, particularly among injecting drug user populations. Behavioural interventions, distribution of bleach disinfectant and other injecting devices alongside clean needles and syringes, and supervised injecting centres are all promising interventions that merit further piloting and evaluation. Where opiate replacement therapy is provided for drug users, adequate

	dosing regimes should be used to minimize the risk of injecting practice. Cost-effectiveness analysis of current interventions aimed at primary prevention of hepatitis C infection shows additional benefits in reducing the prevalence of HIV. HEN, initiated and coordinated by the WHO Regional Office for Europe, is an information service for public health and health care decision-makers in the WHO European Region. Other interested parties might also benefit from HEN.

Spain

AUTHOR(S)	**T. De los Cobos Calleja, M. Casanueva Gutiérrez, C. Jove González**
TITLE	**Perfil de los usuarios de drogas ingresados en un Hospital. Servicio de Urgencias. Hospital de Cabueñes. Cabueñes. Gijón, Asturias**
PUBLICATION	**AN. MED. INTERNA (Madrid)** **Vol. 20, N.º 10, pp. 504-509, 2003**
URL	http://scielo.isciii.es/scielo.php?script=sci_abstract&pid=S0212-71992003001000002&lng=es&nrm=iso&tlng=en
ABSTRACT	Aim: To know the clinical and epidemiological characteristics of drug users admitted to a hospital. Method: A descriptive-retrospective study. Results: Of the 123 patients admitted to the hospital (a total of 155 admissions), 84,5% of them were admitted through the Emergency Department. Their main age was 33 ± 6 and the 65,9% were male. The 90,2% were injecting drug users (IDU). The main age of initiation in the use of drugs was 21 years; and the time of addiction ranged from I to 30 years (69 patients remained addicted to drugs for 10 years or more). There were 102 HCV infections and 13 HBV infections, and 50 patients tested positive for at least I serological marker of hepatitis B infection; 65 were HIV positive (all ofthem were IDU) and 61 were coinfected with HCV. 34 patients had AIDS. Infectious diseases were responsible for 105 of the 155 admissions to hospital. In 134 occasions the patients were discharged and 11 died. Conclusions: Most of the patients were male. The admissions to hospital were mostly due to infectious diseases. The most commonly associated pathologies seen were to be HIV positive and to carry HCV. The outcome of patients was mainly the discharge from hospital, and those who died were all HIV positive.

Prevention

AUTHOR(S)	US Center for Disease Control
TITLE	**Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease**
PUBLICATION	MMWR 47(RR19);1-39 Publication date: 10/16/1998
URL	http://wonder.cdc.gov/ wonder/prevguid/m0055154 /m0055154.asp#head001000000000000
ABSTRACT	These recommendations are an expansion of previous recommendations for the prevention of hepatitis C virus (HCV) infection that focused on screening and follow-up of blood, plasma, organ, tissue, and semen donors (CDC. Public Health Service inter-agency guidelines for screening donors of blood, plasma, organs, tissues, and semen for evidence of hepatitis B and hepatitis C. MMWR 1991;40{No. RR-4};1-17). The recommendations in this report provide broader guidelines for a) preventing transmission of HCV; b) identifying, counseling, and testing persons at risk for HCV infection; and c) providing appropriate medical evaluation and management of HCV-infected persons. Based on currently available knowledge, these recommendations were developed by CDC staff members after consultation with experts who met in Atlanta during July 15-17, 1998. This report is intended to serve as a resource for health-care professionals, public health officials, and organizations involved in the development, delivery, and evaluation of prevention and clinical services.

Risk Factors

Injections

AUTHOR(S)	**Kermode M.**
TITLE	**Unsafe injections in low-income country health settings: need for injection safety promotion to prevent the spread of blood-borne viruses.**
PUBLICATION	**Health Promot Int. 2004 Mar;19(1):95-103.**
URL	
ABSTRACT	Injections are one of the most frequently used medical procedures. The World Health Organization (WHO) estimates

	that 12 billion injections are given annually, 5% of which are administered for immunization and 95% for curative purposes. Unsafe injection practices (especially needle and syringe re-use) are commonplace in low-income country health settings, and place both staff and patients at risk of infection with blood-borne viruses (BBVs). It is estimated that up to 160000 human immunodeficiency virus (HIV), 4.7 million hepatitis C and 16 million hepatitis B infections each year are attributable to these practices. The problem is complex and fueled by a mixture of socio-cultural, economic and structural factors. An appropriate response on the part of international organizations, governments, health administrators, community organizations and health workers, including those who work in the area of HIV/AIDS prevention, has been slow to emerge. This paper reviews the literature relating to unsafe injection practices and the transmission of BBVs in low-income countries in order to raise awareness of the issue and the consequent need to promote injection safety messages amongst both consumers and providers of health care services in these countries. The nature and extent of unsafe injection practices, the burden of blood-borne viral illness attributable to unsafe injection practices, and the factors contributing to these practices are summarized, and possible strategies for promoting injection safety discussed.

AUTHOR(S)	**Lakshman M, Nichter M.**
TITLE	**Contamination of medicine injection paraphernalia used by registered medical practitioners in south India: an ethnographic study.**
PUBLICATION	**Soc Sci Med. 2000 Jul;51(1):11-28.**
URL	
ABSTRACT	While considerable attention has been directed at the important role of intravenous drug use in the spread of human immunodeficiency virus (HIV) and hepatitis B, little research to date has been conducted on the role of medicine injections in disease transmission. This is the case despite the fact that (a) the number of medicine injections is several orders of magnitude greater than injections of illegal drugs and (b) the networks of people potentially affected by contaminated medicine injection paraphernalia is far wider. In this article we examine the medicine injecting practices of a random sample of 40 registered medical practitioners (RMP) who have not had formal training in allopathic medicine (do not have MBBS or MD degrees) in Tamil Nadu, India. Attention is drawn to: (a) the lack of vigilance practitioners exercise in maintaining hygienic needles and syringes, (b) their perceptions of what constitutes acceptable hygienic procedure and (c) how patients respond in contexts where they are able to purchase disposable needles and

	syringes directly from practitioners or from the open market prior to visiting a practitioner. Study results are a cause for alarm and indicate widespread contamination of injection paraphernalia as well as common reuse of disposable needles. The study was confined to RMPs and the researchers strongly suggest that future studies of MBBS trained doctors practising in the public and private sectors be carried out. A structured observation instrument developed to record needle and syringe contamination during the process of injection administration is provided.

AUTHOR(S)	**Marx MA, Murugavel KG, Sivaram S, Balakrishnan P, Steinhoff M, Anand S, Thomas DL, Solomon S, Celentano DD.**
TITLE	**The association of health-care use and hepatitis C virus infection in a random sample of urban slum community residents in southern India.**
PUBLICATION	**Am J Trop Med Hyg. 2003 Feb;68(2):258-62.**
URL	http://www.ajtmh.org/cgi/content/full/68/2/258
ABSTRACT	To determine whether health-care use was associated with prevalent hepatitis C virus (HCV) infection in Chennai, India, 1,947 adults from 30 slum communities were randomly selected to be interviewed about parenteral and sexual risks for HCV infection and to provide biological specimens for HCV and sexually transmitted infection (STI) testing. Prevalent HCV infection was detected in 2.4% of non-injection drug using (IDU) participants. Controlling for other associated factors, and excluding IDU, men who used informal health-care providers were five times as likely to be HCV infected as those who did not use informal providers (Adjusted Odds Ratio, AOR = 5.83; 95% confidence interval [CI]: 1.57, 21.6), a finding not detected in women. More research is needed to determine the extent to which HCV infection is associated with reuse of contaminated injection equipment in health-care settings in developing countries.

AUTHOR(S)	**Pasha O, Luby SP, Khan AJ, Shah SA, McCormick JB, Fisher-Hoch SP.**
TITLE	**Household members of hepatitis C virus-infected people in Hafizabad, Pakistan: infection by injections from health care**

	providers.
PUBLICATION	**Epidemiol Infect. 1999 Dec;123(3):515-8.**
URL	
ABSTRACT	Household members of people with hepatitis C are at increased risk of HCV infection. The prevalence and routes of transmission of HCV to household members in Hafizabad, Pakistan were investigated. Household members of 24 index cases were given a risk factor questionnaire, tested for HCV infection, and the risk factors between the infected and uninfected were compared. Twelve of 74 household members (16.2%) were seropositive for HCV antibody. This was 2(1/2) times the rate of infection in the general population (OR = 2.8; P = 0.01). None of the routes of transmission studied within the household was associated with an increased risk. Household members who received more than 4 injections per year were 11.9 times more likely to be infected than those who had not (P = 0.016). In Hafizabad, the greatest risk for HCV infection to household members of infected people is injections given by health-care workers rather than household contact with infected persons.

AUTHOR(S)	**Anand K, Pandav CS, Kapoor SK; Undergraduate Study Team**
TITLE	**Injection use in a village in north India.**
PUBLICATION	**Natl Med J India. 2001 May-Jun;14(3):143-4.**
URL	
ABSTRACT	BACKGROUND: Injections can transmit infections such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV), and precipitate poliomyelitis. Complications such as injection abscesses and nerve damage may also occur. It is estimated that 50% of the injections given in developing countries are unsafe. However, limited information is available from India. We planned a pilot study to assess the prevalence of injection use and the knowledge of the community and private medical practitioners (PMPs) about injection use. METHODS: One in every four houses in the village under study was selected by systematic random sampling. One adult (> 18 years) respondent in the family was asked questions about family members receiving injections in the past 6 months. Nine PMPs were interviewed about their knowledge and practices regarding injection use. RESULTS: In the past six months, 1280 family members in 285 houses received 1575 injections (2.46 injections per person per year). About 35% had received at least one injection in the past 6 months. Children below 5 years received 3.1 injections/child/year of which about 60% were preventive. On their last visit to a health facility, 55% of the

	subjects were given injections using disposable syringes. About 45% of the 285 respondents knew that diseases could be spread by improper use of injections. While 18% of the respondents said they would prefer injections, 54% preferred oral medications if both were equally effective. After being told the average cost of disposable needles and syringes, 92% of the respondents were willing to buy them. None of the 9 PMPs practising in the village were formally trained in modern medicine. On the day of observation, 18 of 58 patients (30%) seen by PMPs were given injections. Three injections were observed and though they were all given with disposable syringes, the technique of administration did not follow standard guidelines in any. Two PMPs did not know of any disease transmitted by injections. The syringes were usually thrown in a nearby drain or outside the village. Four PMPs said that patients themselves did not ask for injections. CONCLUSION: The use of injections in the study area was high. The PMPs were not only giving a high number of injections but the technique of administration was also wrong. The community was less likely to ask for injections on their own but was willing to buy disposable syringes and needles. The awareness about the risk of injections was low.

AUTHOR(S)	**Simonsen L, Kane A, Lloyd J, Zaffran M, Kane M**
TITLE	**Unsafe injections in the developing world and transmission of bloodborne pathogens: a review.**
PUBLICATION	**Bull World Health Organ. 1999;77(10):789-800.**
URL	
ABSTRACT	Unsafe injections are suspected to occur routinely in developing countries. We carried out a literature review to quantify the prevalence of unsafe injections and to assess the disease burden of bloodborne infections attributable to this practice. Quantitative information on injection use and unsafe injections (defined as the reuse of syringe or needle between patients without sterilization) was obtained by reviewing the published literature and unpublished WHO reports. The transmissibility of hepatitis B and C viruses and human immunodeficiency virus (HIV) was estimated using data from studies of needle-stick injuries. Finally, all epidemiological studies that linked unsafe injections and bloodborne infections were evaluated to assess the attributable burden of bloodborne infections. It was estimated that each person in the developing world receives 1.5 injections per year on average. However, institutionalized children, and children and adults who are ill or hospitalized, including those infected with HIV, are often exposed to 10-100 times as many injections. An average of 95% of all injections are therapeutic, the majority of which were judged to be unnecessary. At least 50% of injections were unsafe in 14 of 19 countries (representing five developing world regions) for which data were available.

	Eighteen studies reported a convincing link between unsafe injections and the transmission of hepatitis B and C, HIV, Ebola and Lassa virus infections and malaria. Five studies attributed 20-80% of all new hepatitis B infections to unsafe injections, while three implicated unsafe injections as a major mode of transmission of hepatitis C. In conclusion, unsafe injections occur routinely in most developing world regions, implying a significant potential for the transmission of any bloodborne pathogen. Unsafe injections currently account for a significant proportion of all new hepatitis B and C infections. This situation needs to be addressed immediately, as a political and policy issue, with responsibilities clearly defined at the global, country and community levels. PIP: Unsafe injections and the consequent transmission of bloodborne pathogens are suspected to occur routinely in the developing world. This paper presents a review of the literature to determine the prevalence of unsafe injection practices and assess the disease burden of bloodborne infections. Quantitative data on injection usage and unsafe injection practices, such as the reuse of unsterilized syringe or needles between patients, is obtained by reviewing published articles and unpublished reports of the WHO. In addition, the transmissibility of hepatitis B and C viruses and HIV was determined using information from studies of needle-stick injuries. All epidemiological researches that associate injections with bloodborne diseases were examined to assess the attributable burden of bloodborne infections. It was estimated that each person in developing countries receives an average of 1.5 injections per annum. However, institutionalized children, children and adults who are sick or confined in hospitals, often receive 10-100 times as many injections. Of these injections, 95% are therapeutic, a majority of which are unnecessary. At least 50% of injections in 14 of 19 countries were unsafe. Furthermore, 18 studies present convincing evidence on the association of unsafe injection practices and the transmission of bloodborne viruses such as hepatitis B and C, Ebola, Lassa virus infections and malaria. Such practices account for a significant number of hepatitis B and C infections.

AUTHOR(S)	**Frank C, Mohamed MK, Strickland GT, Lavanchy D, Arthur RR, Magder LS, El Khoby T, Abdel-Wahab Y, Aly Ohn ES, Anwar W, Sallam I.**
TITLE	**The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt**
PUBLICATION	**Lancet 2000; 355:887-891**

URL	
ABSTRACT	BACKGROUND: The population of Egypt has a heavy burden of liver disease, mostly due to chronic infection with hepatitis C virus (HCV). Overall prevalence of antibody to HCV in the general population is around 15-20%. The risk factor for HCV transmission that specifically sets Egypt apart from other countries is a personal history of parenteral antischistosomal therapy (PAT). A review of the Egyptian PAT mass-treatment campaigns, discontinued only in the 1980s, show a very high potential for transmission of blood-borne pathogens. We examine the relative importance of PAT in the spread of HCV in Egypt. METHODS: The degree of exposure to PAT by cohort was estimated from 1961-86 Ministry of Health data. A cohort-specific exposure index for PAT was calculated and compared with cohort-specific HCV prevalence rates in four regions. FINDINGS: HCV prevalence was calculated for 8499 Egyptians aged 10-50 years. A significant association between seroprevalence of antibodies to HCV and the exposure index (1.31 [95% CI 1.08-1.59]; p=0.007) was identified across four different regions. In all regions cohort-specific HCV prevalence was lowest in children and young adults than in older cohorts. These lower prevalence rates coincided with the gradual and final replacement of PAT with oral antischistosomal drugs at different points in time in the four regions. INTERPRETATION: The data suggest that PAT had a major role in the spread of HCV throughout Egypt. This intensive transmission established a large reservoir of chronic HCV infection, responsible for the high prevalence of HCV infection and current high rates of transmission. Egypt's mass campaigns of PAT may represent the world's largest iatrogenic transmission of blood-borne pathogens.

AUTHOR(S)	**Rajasekaran M, Sivagnanam G, Thirumalaikolundusubramainan P, Namasivayam K, Ravindranath C.**
TITLE	**Injection practices in southern part of India.**
PUBLICATION	**Public Health. 2003 May;117(3):208-13.**
URL	
ABSTRACT	The World Health Organization defines 'a safe injection' as one that does not harm the recipient, does not expose the provider to any avoidable risk, and does not result in any waste that is dangerous to the community. Irrational and unsafe injection practices are rife in developing countries. The objective of the present study was to assess the injection practices in the state of Tamilnadu, India, using the Rapid assessment and response guide of the Safe Injection Global Network of the World Health Organization. Thirty-nine prescribers, 62 providers, and 175

	members of the general public were interviewed. The areas were chosen out of convenience while at the same time adhering to the guidelines. The study was carried out between April and June 2001. The per capita injection rate was 2.4 per year. The ratio of therapeutic to immunization injections was 6.5:1, and the proportion of injections given with a disposable syringe and needle was 35.4%. Knowledge about diseases transmitted by unsafe injections, for example involving human immunodeficiency virus and hepatitis B virus, was greater among all the study groups. The annual incidence of needlestick injuries among providers was 23.6, which is extremely high. It is concluded that there are deficiencies in practice such as an excessive, unwarranted usage of injections, a sizeable prevalence of unsafe injection practices, the short supply of injection equipment leading to a high incidence of needlestick injuries, a low proportion of hepatitis B virus immunization among providers, and a lack of adequate sharps containers and disposal facilities in this part of India. It is suggested that immediate and long-term remedial measures, such as the education of prescribers to reduce the number of injections to a bare minimum, an adequate supply of injection equipment, provider protection with immunization for hepatitis B virus, the provision of adequate sharps containers with safe disposal facilities and, not least, community education, be undertaken to avoid the future epidemic of transmissible diseases.

AUTHOR(S)	**Reeler AV.**
TITLE	**Anthropological perspectives on injections: a review.**
PUBLICATION	**Bull World Health Organ. 2000;78(1):135-43.**
URL	
ABSTRACT	Qualitative studies from developing countries have pointed to the widespread popularity of injections. In addition to their use by formal and informal providers and traditional healers, there is now increasing evidence of the use of injections and injection equipment by lay people. Epidemiological research links the large number of unsafe injections to serious bloodborne infections such as viral hepatitis B and C and acquired immunodeficiency syndrome (AIDS). The present article examines the reasons behind the demand for injections by consumers and the administration of unnecessary or unsafe injections by different types of provider. Interventions aimed at reducing the risk of unsafe injections are discussed in relation to cultural and social factors as well as those factors associated with health systems. Suggestions are made for approaches to the design of such interventions

	PIP: This paper reviews the anthropological perspectives on injections. Qualitative studies from developing countries have pointed out the widespread popularity of injections, which varies according to the culture concerned. Injections are seen as an outstanding symbol of biomedicine and have often been portrayed as such in health and vaccination campaigns. There is now increasing evidence of the use of injections and injection equipment by lay people. Epidemiological research links a large number of unsafe injections to serious bloodborne infections such as viral hepatitis B and C and AIDS. This article examines the reasons for the increasing demand of injections by consumers and the administration of unnecessary or unsafe injections by different types of provider. Furthermore, interventions to reduce the number of unnecessary injections are discussed in relation to cultural and social factors, as well as those associated with health systems. Suggested approaches useful in the design of such interventions are outlined.

AUTHOR(S)	**Simonsen L, Kane A, Lloyd J, Zaffran M, Kane M.**
TITLE	**Unsafe injections in the developing world and transmission of bloodborne pathogens: a review.**
PUBLICATION	**Bull World Health Organ. 1999;77(10):789-800.**
URL	
ABSTRACT	Unsafe injections are suspected to occur routinely in developing countries. We carried out a literature review to quantify the prevalence of unsafe injections and to assess the disease burden of bloodborne infections attributable to this practice. Quantitative information on injection use and unsafe injections (defined as the reuse of syringe or needle between patients without sterilization) was obtained by reviewing the published literature and unpublished WHO reports. The transmissibility of hepatitis B and C viruses and human immunodeficiency virus (HIV) was estimated using data from studies of needle-stick injuries. Finally, all epidemiological studies that linked unsafe injections and bloodborne infections were evaluated to assess the attributable burden of bloodborne infections. It was estimated that each person in the developing world receives 1.5 injections per year on average. However, institutionalized children, and children and adults who are ill or hospitalized, including those infected with HIV, are often exposed to 10-100 times as many injections. An average of 95% of all injections are therapeutic, the majority of which were judged to be unnecessary. At least 50% of injections were unsafe in 14 of 19 countries (representing five developing world regions) for which data were available.

	Eighteen studies reported a convincing link between unsafe injections and the transmission of hepatitis B and C, HIV, Ebola and Lassa virus infections and malaria. Five studies attributed 20-80% of all new hepatitis B infections to unsafe injections, while three implicated unsafe injections as a major mode of transmission of hepatitis C. In conclusion, unsafe injections occur routinely in most developing world regions, implying a significant potential for the transmission of any bloodborne pathogen. Unsafe injections currently account for a significant proportion of all new hepatitis B and C infections. This situation needs to be addressed immediately, as a political and policy issue, with responsibilities clearly defined at the global, country and community levels. PIP: Unsafe injections and the consequent transmission of bloodborne pathogens are suspected to occur routinely in the developing world. This paper presents a review of the literature to determine the prevalence of unsafe injection practices and assess the disease burden of bloodborne infections. Quantitative data on injection usage and unsafe injection practices, such as the reuse of unsterilized syringe or needles between patients, is obtained by reviewing published articles and unpublished reports of the WHO. In addition, the transmissibility of hepatitis B and C viruses and HIV was determined using information from studies of needle-stick injuries. All epidemiological researches that associate injections with bloodborne diseases were examined to assess the attributable burden of bloodborne infections. It was estimated that each person in developing countries receives an average of 1.5 injections per annum. However, institutionalized children, children and adults who are sick or confined in hospitals, often receive 10-100 times as many injections. Of these injections, 95% are therapeutic, a majority of which are unnecessary. At least 50% of injections in 14 of 19 countries were unsafe. Furthermore, 18 studies present convincing evidence on the association of unsafe injection practices and the transmission of bloodborne viruses such as hepatitis B and C, Ebola, Lassa virus infections and malaria. Such practices account for a significant number of hepatitis B and C infections.

Intravenous Drug Use

AUTHOR(S)	**Susan Beckerleg, Maggie Telferand, Gillian Lewando Hundt.**
TITLE	**The rise of injecting drug use in east Africa: a case study from Kenya**
PUBLICATION	**Harm Reduction Journal 2005,** 2:**12**
URL	http://www.harmreductionjournal.com/content/2/1/12
ABSTRACT	Studies on injecting drug use in East Africa are reviewed. The

	existingstudies document the spread of heroin injection in Kenya and Tanzania, both countries where HIV rates are high. No data from Uganda on injecting drug use was found by the authors. A case study of the growth of heroin injection in a Kenyan coastal town is presented. The need for needle-exchange programmes and other prevention services is discussed.

AUTHOR(S)	**Wodak A**
TITLE	**Injecting nation: Achieving control of hepatitis C in Australia.**
PUBLICATION	**Drug Alcohol Rev. 1997 Sep; 16(3): 275-84**
URL	
ABSTRACT	Since Australia banned heroin in 1953 consumption of illicit drugs, deaths, crime and corruption related to drugs have steadily increased. Injecting drug use (IDU) in Australia is now a significant public health problem linked each year to approximately 500 overdose deaths and more than 6000 hepatitis C infections. At least 85% of prevalent and incident hepatitis C cases in Australia are injecting drug users (IDUs) with annual incidence estimated at 15%. Although poorly documented, increasing numbers of patients with end-stage liver disease from hepatitis C now appear to present in Australia. This reflects a heroin-injecting epidemic commencing a quarter of a century ago, the close association between drug injecting and hepatitis C and the long delay between hepatitis C infection and complications. The overall health and economic burden of hepatitis C may soon exceed HIV. Control is far more difficult to achieve for hepatitis C than HIV because of much higher baseline prevalence levels and far greater infectiousness by blood to blood spread. Transmission appears to follow minimal breaches of infection control guidelines. Hepatitis C has not yet become a priority public health issue in Australia. No national prevention strategy has been proposed. Prevention strategies (such as needle exchange or methadone) which controlled HIV among IDUs should be expanded, with the expectation of some useful reduction of spread but without achieving control of hepatitis C. Other options for control must be considered. Eradicating illicit drug use in Australia is unachievable. Virtually eradicating injecting drug use by facilitating a switch to non-injecting routes of administration (NIROA) is achievable (although difficult) and this could control hepatitis C. NIROA will have the probable additional benefit of reducing drug overdose deaths. NIROA has begun recently to replace injecting in several countries without government intervention. Powerful cultural,

	pharmacological and economic factors strongly reinforce drug injecting. Economic impediments to NIROA could be reduced by drug policy reform. Facilitating a switch to NIROA carries some risk of increased discrimination directed against an already marginalized population. A major obstacle to harm reduction is the common assumption that any relaxation of drug policy invariably leads to increased consumption. Switching the predominant route of administration of illicit drugs from IDU to NIROA should be the major focus of national efforts to control hepatitis C and overdose deaths in Australia.

Nosocomial Infections

AUTHOR(S)	**Comstock RD, Mallonee S, Fox JL, Moolenaar RL, Vogt TM, Perz JF, Bell BP, Crutcher JM.**
TITLE	**A Large Nosocomial Outbreak of Hepatitis C and Hepatitis B Among Patients Receiving Pain Remediation Treatments**
PUBLICATION	**Infect Control Hosp Epidemiol. 2004 Jul;25(7):576-83.**
URL	
ABSTRACT	BACKGROUND AND OBJECTIVE: In August 2002, the Oklahoma State Department of Health received a report of six patients with unexplained hepatitis C virus (HCV) infection treated in the same pain remediation clinic. We investigated the outbreak's extent and etiology. DESIGN, SETTING, AND PARTICIPANTS: We conducted a retrospective cohort study of clinic patients, including a serologic survey, interviews of infected patients, and reviews of medical records and staff infection control practices. Patients received outpatient pain remediation treatments one afternoon a week in a clinic within a hospital. Cases were defined as HCV or hepatitis B virus (HBV) infections among patients who reported no prior diagnosis or risk factors for disease or reported previous risk factors but had evidence of acute infection. RESULTS: Of 908 patients, 795 (87.6%) were tested, and 71 HCV-infected patients (8.9%) and 31 HBV-infected patients (3.9%) met the case definition. Multiple HCV genotypes were identified. Significantly higher HCV infection rates were found among individuals treated after an HCV-infected patient during the same visit (adjusted odds ratio [AOR], 6.2; 95% confidence interval [CI95], 2.4-15.8); a similar association was observed for HBV (AOR, 2.9; CI95, 1.3-6.5). Review of staff practices revealed the nurse anesthetist had been using the same syringe-needle to sequentially administer sedation medications to every treated patient each clinic day. CONCLUSIONS: Reuse of needles-syringes was the mechanism for patient-to-patient transmission of HCV and HBV in this large nosocomial outbreak. Further education and stricter oversight of infection control practices may prevent future outbreaks.

Percutaneous

AUTHOR(S)	**Am J Ind Med. 2005 Dec; 48(6): 482-90**
TITLE	**Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers.**
PUBLICATION	**Pruss Ustun A; Rapiti E; Hutin Y**
URL	
ABSTRACT	BACKGROUND: The global burden of hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV) infection due to percutaneous injuries among health care workers (HCWs) is estimated. METHODS: The incidence of infections attributable to percutaneous injuries in 14 geographical regions on the basis of the probability of injury, the prevalence of infection, the susceptibility of the worker, and the percutaneous transmission potential are modeled. The model also provides the attributable fractions of infection in HCWs. RESULTS: Overall, 16,000 HCV, 66,000 HBV, and 1,000 HIV infections may have occurred in the year 2000 worldwide among HCWs due to their occupational exposure to percutaneous injuries. The fraction of infections with HCV, HBV, and HIV in HCWs attributable to occupational exposure to percutaneous injuries fraction reaches 39%, 37%, and 4.4% respectively. CONCLUSIONS: Occupational exposures to percutaneous injuries are substantial source of infections with bloodborne pathogens among health-care workers (HCWs). These infections are highly preventable and should be eliminated..

Surveillance

AUTHOR(S)	**Toledo AC Jr, Januario JN, Rezende RM, Siqueira AL, Mello BF, Fialho EL, Ribeiro RA, Silva HL, Pires EC, Simoes TC, Greco DB.**
TITLE	**Dried blood spots as a practical and inexpensive source for human immunodeficiency virus and hepatitis C virus surveillance.**
PUBLICATION	Mem Inst Oswaldo Cruz. 2005 Jul;100(4):365-370. Epub 2005

	Aug 17.
URL	
ABSTRACT	Passive surveillance of infectious diseases with a high percentage of asymptomatic cases or long incubation periods, such as acquired immunodeficiency syndrome (AIDS), does not reflect the current transmission dynamics. Thus, a multi-strategic surveillance, such as the human immunodeficiency virus (HIV) sentinel surveillance proposed by the World Health Organization (WHO), is necessary. The Brazilian HIV sentinel surveillance was started in May 1992 with this purpose. The objectives of this study were to evaluate the feasibility and costs of HIV and hepatitis C virus (HCV) surveillance using dried blood spots (DBS) collected for neonatal screening of metabolic diseases in the state of Minas Gerais, Brazil. This was accomplished through the comparison of HIV and HCV seroprevalence with previous Brazilian studies. From December 2001 to June 2002, 24,905 newborns were tested for HIV and 4211 for HCV. HIV seroprevalence was 0.25% and the 95% confidence interval (CI) was 0.18, 0.31%; and HCV seroprevalence was 0.71% and the 95% CI was 0.46, 0.97%. These numbers are similar to previous Brazilian studies. Cost in this study was approximately USD 3.10 per sample, which was roughly one third of the cost of the same exam at the Brazilian HIV sentinel surveillance. We conclude that it is possible and more cost-effective to use DBS for infectious diseases surveillance, albeit it is still necessary to compare these results with the usual sentinel methodology in a concomitant trial.

Treatment

AUTHOR(S)	**Hadziyannis SJ.**
TITLE	**Why and how to treat chronic hepatitis C**
PUBLICATION	**Can J Gastroenterol. 2000 Jul-Aug;14 Suppl B:45B-48B**
URL	
ABSTRACT	Chronic hepatitis C (CHC) is a major health problem worldwide, with approximately 200 million affected individuals and a significant rate of progression to end-stage cirrhosis and hepatocellular carcinoma (HCC). If hepatitis C virus (HCV) infection is left untreated in the population, then the number of liver-related deaths will soon double and the need for liver transplantation may increase to five times that seen today. Available therapies for CHC are restricted to interferon alpha (IFN alpha) monotherapy and to the combination of IFN alpha and ribavirin. Despite their high cost and side effects, both of these therapies have proved to be cost effective, particularly combination therapy. IFN alpha monotherapy for one year can induce sustained response (SR) rates of approximately 10% in

	naive patients infected with HCV genotype 1, and above 50% in those infected with other genotypes. Combination therapy can double or even triple the rate of SR in genotype 1 infections and may further increase the SR rate in the other HCV genotypes. Combination therapy has also been proven to be effective in approximately 50% of relapsed responders to IFN alpha monotherapy. In clinical practice, the decision to treat should be individualized and tailored on the basis of several virus- and host-related factors, particularly the grade and stage of liver disease, HCV genotype and levels of viremia. Appropriate monitoring of therapy by careful clinical evaluation, liver biochemistry and serum HCV RNA testing is mandatory. IFN alpha therapy may also prove to be effective in reducing the rate of HCC development in CHC regardless of whether a virological response is achieved, but this remains to be established.