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Occupational Co-Infection with HIV and HCV

Reported Cases Worldwide in the Medical Literature and News Reports

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Introduction

SIMULTANEOUS CO-INFECTION WITH HUMAN immunodeficiency virus (HIV) and hepatitis C virus (HCV) following an occupational exposure in healthcare settings is, fortunately, a rare event. Since the first documented case of occupational HIV transmission was reported 20 years ago[1], ten cases of co-infection in healthcare workers (HCWs) have been reported worldwide in the medical literature. While there are too few cases to make general recommendations for management, an analysis of the cases does yield some useful observations.

Risk assessment: When assessing the serostatus of source patients, it is important to remember that spontaneous disappearance of antibodies to HCV has been reported[2], and that HCV "sero-reversion" is 2-1/2 times more likely in HIV-positive than in HIV-negative patients.[2-4] Furthermore, HCV RNA has been detected in HCV-antibody-negative patients, especially those who are immunocompromised, at a prevalence rate of about 3%.[5] A case has been reported in the U.S. of a nurse who sustained a needlestick from a source patient who had end-stage AIDS but tested negative for HCV at the time of the exposure. However, the nurse seroconverted to both HIV (at 9-1/2 months postexposure) and HCV (at one year postexposure). The patient died shortly after the exposure and could not be retested, but an investigation of the case led to the conclusion that the nurse's HCV infection was most likely due to her occupational exposure, since she had no other risk factors for HCV.[6] In Italy's national surveillance program that tracks HCWs' exposures to bloodborne pathogens (SIROH), two similar cases, involving HCV only, were observed—i.e., the HCW was infected with HCV after an occupational exposure, although the source patient tested negative for the virus at the time of exposure (Gabriella De Carli, SIROH, personal communication). Such cases reinforce the importance of storing a plasma sample from both the source patient and the HCW following an occupational exposure, particularly when underlying conditions, such as severe immunodepression, may alter the validity of a screening test performed at the time of the exposure.

Diagnosis: Two cases of co-infection (including the one mentioned above) had an unusually long incubation period for both HIV and HCV; clinical symptoms did not appear until more than six months after exposure, and seroconversion was delayed until more than nine months postexposure.[6,7] There is evidence of a pathogenic interaction between the two viruses, but it has not been fully characterized. Guidelines from the Centers for Disease Control and Prevention

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(CDC)[8] recommend that HIV follow-up be extended to 12 months for HCWs who are infected with HCV following an exposure to a co-infected source. European guidelines suggest testing the HCW at one year postexposure for HIV and HCV antibodies in cases where the source patient is co-infected.[9,10]

HCV diagnosis may be further complicated by treatment of the HCW with a regimen of antiretroviral postexposure prophylaxis (PEP) to prevent HIV infection. PEP can cause alterations in the liver enzyme levels of the person being treated, at a rate of approximately 0.5 per 100 person-months for regimens that include a protease inhibitor, and 25 per 100 person-months for regimens that include nevirapine.[11] It may be difficult to discern whether these alterations are caused by the PEP or by the onset of acute hepatitis C. Similarly, the most common side effects of PEP, such as nausea, vomiting, and malaise, are also typical symptoms of acute infection with hepatitis C.

Treatment during the acute phase: No data are available regarding treatment of acute HIV/HCV co-infection, and information regarding treatment of acute HIV infection from clinical trials is limited.[12-16] Therapy for primary HIV infection is based on theoretical considerations, and the potential benefits should be weighed against the actual risks, such as adverse effects on quality of life, limits to future treatment options in case of drug resistance, and the need for continuing therapy indefinitely.[17] More information is available on the treatment of acute HCV infection. Clinical, non-controlled trials have demonstrated a beneficial effect of interferon therapy during the acute phase[18]; however, because there are no data indicating that early treatment of acute HCV is more effective than early treatment of chronic hepatitis C infection[19], and because in many cases infection may resolve without therapy[20], a wait-and see approach has also been suggested.

Treatment during the chronic phase: Complications associated with concurrent HIV/HCV infection have emerged as one of the most frequently discussed and complex issues in the care of patients with HIV and AIDS. Consequently, many clinical trials have been conducted to identify optimal treatment and establish recommendations for the management of chronic co-infection with HIV and HCV. Therapy with peginterferon alfa 2a plus ribavirin is currently suggested as the standard of care, achieving an overall rate of sustained virologic response ranging from 26% to 40%, depending on HCV genotype.[21-24] One study indicated that almost one-third of HIV/HCV co-infected patients relapsed following discontinuation of apparently successful anti-HCV therapy; thus, extended periods of anti-HCV therapy may improve the outcome in co-infected patients.[25]

In the absence of more definitive studies, therapeutic decisions in individual cases of HIV/HCV co-infection should be based on the clinical judgment of the healthcare provider in charge of the case, based in turn on the clinical presentation of the infections, whose manifestations may range from little or no symptoms to very severe and rapidly progressive illness. Toxicity and interactions of currently available drugs limit their use both in the acute and the chronic phase; however, new treatment drugs for both infections are being developed that aim to reduce or eliminate adverse side effects.

Our greatest efforts should be focused on preventing occupational infections with HIV and HCV, or co-infections with both, through the use of safety-engineered devices, personal protective equipment and safer work practices.

Cases of Occupational Co-infection with HIV and HCV, Reported in the Medical Literature and News Reports, through 2004

The following list is based on an in-depth, but not exhaustive, search of the medical literature and news reports. To our knowledge it includes all the documented cases of HIV/HCV co-infection; it may not, however, include all possible cases of co-infection in the literature (i.e., cases that were reported prior to the availability of a definitive test for hepatitis C, in which infection with nonA-nonB hepatitis, as well as HIV, was indicated). Of ten cases, six involved a percutaneous exposure, and four involved blood splashes or sprays (three to conjunctiva/mucoca, one to non-intact skin).

1. **Country: Italy. Year case reported: 1988**. **Year of exposure/injury: 1987.** A 37-year-old intensive care nurse sustained **conjunctival and oral mucosa exposure** to a large quantity of blood from an asymptomatic HIV-positive hemophiliac patient while trying to clear a blocked arterial catheter. Eleven days postexposure, she developed symptoms including fatigue, fever with chills and arthralgia. Three weeks postexposure she had a positive HIV-antigen test. Seroconversion was documented by ELISA and Western blot tests on day 43 postexposure. Within 3 months, she developed acute nonA-nonB hepatitis (a test for HCV was not yet available). The nurse developed AIDS in 1991, and died in 1992.
Reported in: *Gioannini P, Sinicco A, Cariti G, Lucchini A, Paggi G, Giachino O. HIV infection acquired by a nurse. European Journal of Epidemiology. 1988;4(1):119-120. Further discussion of the case can be found in: Ippolito G, Puro V, De Carli G, and the Italian Study Group on*

Occupational Risk of HIV Infection. The risk of occupational human immunodeficiency virus infection in health care workers. Archives of Internal Medicine. (1993;153:1451-1458)

2. **Country: Spain. Year case reported: 1996. Year of exposure/injury: 1993.** A 21-year-old female nurse in Spain (Hospital del Mar, Barcelona) sustained a **needlestick injury** after drawing blood from an HIV/HCV co-infected patient (the patient, an IV drug user, was diagnosed with HIV in 1989). She was offered PEP with zidovudine, but refused it. Forty-four days after exposure she was symptomatic for acute hepatitis C. Subsequent laboratory tests showed elevation in the aminotransferases and antibodies to HIV. Seroconversion to HCV was detected at 3-1/2 months (109 days) after exposure; HIV seroconversion was delayed for more than 6 months postexposure. The HCW died of complications from HCV infection 28 months after her needlestick.
Reported in : Garces JM, Yazbeck H, Pi-Sunyer T, Gutierrez-Cebollada J, Lopez-Colomes JL. Simultaneous human immunodeficiency virus and hepatitis C infection following a needlestick injury. European Journal of Clinical Microbiology and Infectious Diseases. 1996;15(1):92-94.

3. **Country: United States. Year case reported: 1997. Year of injury: 1990.** (Joint report from the Massachusetts Department of Health, the Centers for Disease Control and Prevention [CDC], and the Neponset Valley Health System, Massachusetts.) A 48-year-old healthcare worker sustained a **deep injury from a blood-filled needle** used to draw blood from an AIDS patient. Blood also spilled from collection tube into gap between worker's wrist and gloves and onto her hands, which were chapped with open cracks. HIV seroconversion was delayed for more than six months after exposure (detected between 8 and 9-1/2 months postexposure); seroconversion to HCV occurred between 9-1/2 and 13-1/2 months postexposure. 28 months after needlestick, HCW died of complications from HCV (hepatic coma and renal failure). The authors comment: "The clinical course of the health care worker was remarkable for rapid progression to hepatic failure and death." They recommended that, "In the case of simultaneous occupational exposure to HIV and HCV or in the event of clinical symptoms or signs of infection more than six months after exposure, evaluation for late seroconversion may be needed."
Reported in: Ridzon R, Gallagher K, Ciesielski C, Mast EE, Ginsberg MB, Robertson BJ, Luo C-C, DeMaria A. Simultaneous transmission of human immunodeficiency virus and hepatitis C virus from a needle-stick injury. New England Journal of Medicine. 1997:336(13):919-922.

4. **Country: Italy. Year case reported: 1998**. A clinical lab worker sustained a **conjunctival exposure from blood splash** (approximately 0.5 mL) when disposing of open sample tubes, at least six of which contained blood samples from HIV patients in various stages of the disease. There was no contact of blood with the worker's mouth, and she had no open lesions on her skin. The HCW had no other risk factors for HIV or HCV. The worker began prophylactic treatment with zidovudine within 3 hours postexposure; however, the worker developed acute HIV infection 29 days postexposure, and had positive enzyme immunoassay and Western blot tests at 53 days postexposure. An HCV antibody test was positive at 3 months postexposure.

The authors commented: "We postulate that in acute coinfection, the pathogenic interactions between HIV and HCV could interfere with the initial immune response that occurs following primary HIV infection and could lead to an extremely high HIV burden with a more rapid HIV disease progression."
Reported in: Ippolito G, Puro V, Petrosillo N, De Carli G, Micheloni

WHAT DOES CO-INFECTION COST?

Cost of Drugs to Treat A Healthcare Worker Occupationally Infected with HIV and HCV

These costs were reported by Lisa Black, RN, as of May 2001, when she was taking drugs to treat both HIV and HCV. After four years of combination therapy for HCV, however--with constant, debilitating side effects--she stopped treatment in 2002. Since then, her HCV viral load, while not undetectable, has remained stable. She continues to take combination therapy for HIV (she now takes Combivir and Sustiva).

Cost:	**Monthly**	**Annual**
HIV—3-drug cocktail (AZT, 3TC, Nelfinavir) [Nelfinavir is protease inhibitor]	$2,500	$30,000
HCV		
- Interferon/ribavirin combination treatment	$2,000	$24,000
- Neupogen injections 2x's week to maintain white blood cell count @ $300/dose	$2,400	$28,800
Total approximate annual cost for treatment of HIV and HCV co-infection:		**$82,800**

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G, Magliano, E, Coordinating Centre of the Italian Study on Occupational Risk of HIV Infection. Simultaneous infection with HIV and hepatitis C virus following occupational conjunctival blood exposure [letter]. Journal of the American Medical Association (JAMA). 1998;280(1):28.

5. **Country: United States. Year case reported: 1999. Year of exposure/injury: 1997.** A 26-year-old medical-surgical nurse sustained an **injury to her palm from a needle on a syringe** that was used to aspirate a blood clot from occluded catheter on an IV line. The source patient had end-stage AIDS and died 10 days after the incident. HCW tested negative for HIV and HCV at time of exposure; patient tested negative for HCV at time of exposure. HCW was started on triple PEP (AZT, 3TC, Crixivan) within two hours postexposure. At nine months postexposure, she was found positive for HIV via a PCR test (viral load of 250,415 HIV viral particles per milliliter of blood); ELISA antibody test was negative. At 12 months postexposure, HCW tested positive for HCV; she had no other risk factors for HCV, and was presumed infected with HCV from the source patient.
Reported in: Black LM. One unnecessary needle = HIV + HCV. Advances in Exposure Prevention. 1999;4(3):25,27-29.

6. **Country: United States. Year case reported: 1999. Year of exposure/injury: 1998.** An emergency room nurse who had worked in the ED at Brigham & Women's Hospital in Boston for 22 years sustained a **deep needlestick injury** to her right index finger as she was attempting to dispose of a needle in a sharps container. She was stuck by an unprotected needle protruding from the top of the sharps disposal container. Her baseline tests for HIV and HCV were negative. (She was HBV-antibody-positive from an occupational blood exposure in the late 1970s; that infection resolved quickly and she had been asymptomatic since.) At 4-5 weeks postexposure she developed symptoms including weight loss, severe nausea, abdominal pain, chills, profuse sweating, and insomnia. At six months postexposure, she tested positive for both HIV and HCV .
Reported in: Daley K. Demanding safety. Advances in Exposure Prevention. 1999;4(4):39-41.

7. **Country: United States. Year case reported: 1999. Year of exposure/injury: 1998.** A 51-year-old phlebotomist sustained a **needlestick from a 21-gauge needle after drawing blood** from a patient (an IV drug user) infected with HIV and HCV. She began prophylaxis with a combination of four drugs (Zidovudine/lamivudine/indinavir/didanosine) within an hour of her exposure, and continued PEP for 6 weeks. Seven weeks after exposure she was documented to be infected with HIV and HCV.
Reported in: Perdue B, Wolde Rufael D, Mellors J, Quinn T, Margolick J. HIV-1 transmission by a needle-stick injury despite rapid initiation of four-drug postexposure prophlaxis [abstract 210]. In: Abstracts of the 6th Conference on Retroviruses and Opportunistic Infections. Chicago: Foundation for Retrovirology and Human Health; 1999, p. 107. Available on-line at: http://www.retroconference.org/99/abstracts/210.htm.

8. **Country: United States. Year case reported: 2000.** This case of a HCW co-infected with HIV and HCV from a **percutaneous injury** was reported by the CDC from data collected by the NaSH Surveillance Group between 1995 and 1999. Seroconversion to HCV took place within 6 months; HIV seroconversion was delayed until 13 months postexposure.
Reported in: Campbell SR, Srivastava P, Williams I, Alter M, Cardo D, NaSH Surveillance Group, Centers for Disease Control and Prevention. Hepatitis C virus infection after occupational exposure [abstract]. Infection Control and Hospital Epidemiology. 2000;21:107.

9. **Country: United States. Year case reported: 2003. Year of exposure/injury: 1999/2000.** The CDC reported that in January 2000, a 35-year-old nursing home aide was found to be co-infected with HIV and HCV during a routine blood donor screening. The worker had tested negative for HIV and HCV 6 weeks earlier during a blood donor screening. In December 1999 and January 2000, the HCW reported having numerous exposures to an HIV-infected patient's body fluids (diarrhoea, vomit); the worker had no other risk factors for HIV or HCV. The source patient had severe dementia resulting in urinary and faecal incontinence. The HCW did not perform any procedures on the patient involving sharps during period of care. The worker routinely wore gloves, but reported that they tore easily, and recalled **numerous exposures of chapped and abraded hands to patient's emesis, faeces and urine**. During interviews, investigators noted that the HCW's hands were "cracked, abraded and lacerated," reportedly as a result of outside employment as a landscaper; the HCW also had a history of psoriasis. *This is the first reported case of simultaneous transmission of HIV and HCV from occupational exposure of non-intact skin to body fluids.*
Reported in: Beltrami EM, Kozak A, Williams IT, Saekhou AM, Kalish ML, Nainan OV, Stramer SL, Fucci M-C, Frederickson D, Cardo DM. Trans-

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mission of HIV and hepatitis C virus from a nursing home patient to a health care worker. American Journal of Infection Control. 2003;31:168-175.

10. **Country: United States. Year reported: 2004. Year of exposure/injury: 2003.** On 3/12/03, a 31-year-old clinical lab technologist sustained mucous membrane exposures to her eyes, nose and mouth from HIV- and HCV-contaminated blood when a blood analyzer machine malfunctioned. The machine (Labotech, manufactured by Aldaltis) issued an error reading; when the worker opened the machine, a loose part crashed onto the plate holding blood samples from approximately 30 patients, as well as control samples containing HIV- and HCV-infected serum. Although the worker was wearing both protective goggles and a mask, blood ran down under her goggles into her eyes, and also dripped behind her mask into her nose and mouth. After washing the blood off her face, she reported to the emergency room, where she had baseline tests for HIV and HCV and was immediately started on a course of HIV PEP. Her baseline tests were negative. Three months later, she was hospitalized with a high fever and flu-like illness; at that time, she was re-tested and found positive for both HIV and HCV.

Reported in: Roche Walter F. "Hospital was told of faulty HIV tests; Ex-Maryland General worker sent letter in December; Former employee files suit; Woman says flawed gear infected her with diseases." Baltimore Sun, 3/12/04. (Available on-line at: http://www.baltimoresun.com/news/local/bal-lab0312,0,6248598.story

See also: *Roche, Walter F. "Ill ex-hospital worker cites lab troubles, fearing worst." Baltimore Sun, 3/19/04. Available at: http://www.baltimoresun.com/news/local/bal-lab0319,0,6707357.story* ❐

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http://www.europa.eu.int/comm/health/ph_projects/2000/com_diseases/fp_commdis_2000_frep_10_en.pdf
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