

Risk of occupational HIV, HBV and HCV transmission based on source patient infectiousness and exposure intensity - data from three Swiss hospitals

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INTRODUCTION AND PURPOSE

- Sharps injuries and mucous membrane exposures are frequent in health care and associated with transmission of HIV, hepatitis B- (HBV) and hepatitis C virus (HCV).
- Transmission risk depends on¹⁻⁴:
 - Source patient infectiousness at time of exposure
 - with risk proportional to viral load (VL)
 - and a negligibly small respectively no risk assumed in all three viruses with suppressive antiviral treatment⁵ respectively in cured hepatitis C.
 - Type and intensity of exposure
 - increased risk is seen in percutaneous injuries, especially with hollow-bore instruments after intravascular use and with intraoperative exposures
 - less transmission prone are exposures of mucous membranes or non-intact skin; exposures to body fluids such as liquor, pleural-, peritoneal- and amniotic fluids. Urine and saliva are considered as risk only if blood-contaminated.
- Published reports on occupational exposures evaluated the combination of source patient infectiousness and type of exposure only for accomplished transmissions.
- Sharps injuries can cause considerable distress to healthcare workers. Acknowledgement of the no-risk nature of a number of exposures would enable reduction of unjustified distress and of unwarranted laboratory exams.

METHODS

- At the Cantonal Hospital St. Gallen and two adjoining hospitals (900 beds, ambulatory services including HIV and HCV care, 5600 employees), all prospectively collected data on sharps and splash injuries from 2007 to 2012 were retrospectively analysed.
- In source patients with HIV or HCV, infectiousness at time of exposure was evaluated by disease/treatment history and VL. For HBV, source patient infectiousness was only tested in nonimmune exposed persons.
- Exposure type and intensity were categorized according to body fluid, affected body area and likely amount of percutaneously transmitted fluid.
- In cases regarded as risk, HIV-exposed healthcare workers received antiretroviral postexposure prophylaxis (PEP); HCV-exposed healthcare workers had monthly ALT tests, with HCV RNA determination following in case of increase.
- In all reported sharps and splash injuries, HIV and HCV serology was measured 6-9 months after the incident for insurance reasons.

RESULTS

- Among 1370 reported exposures, 83% were sharps injuries, 15% mucous membrane- or skin exposures. 73 of all exposures (5%) occurred with HCV- or HIV-positive sources. Table 1 and 2 show the risk evaluations in exposures to HCV- or HIV-positive patients, respectively. Based on the combination of source patient infectiousness and exposure intensity, 16 of these exposures (22%) were classified as increased risk (21 if missing data were considered as risky situation), 10 (14%) as reduced and 40 (55%) as no risk.
- HBV immunity was incomplete in 10 exposed persons. Among these exposures, HBV source patient testing was negative in 7 and missing in 3 patients.
- No HIV-, HCV- or HBV seroconversion occurred among exposed healthcare workers.

Table 1

HCV-positive source patients: evaluation of exposure risk		
Increased risk	Intraoperative sharps-/ hollow-bore needle injury	14: detectable VL 5: unavailable VL
Reduced risk	3: insulin needle-/ shaving razor injuries, detectable VL 7: conjunctival blood exposures, detectable VL	
No risk	9: blood on intact skin 9: sharps injuries, undetectable VL 3: pricks with no-risk fluids 3: no-risk fluids on mucous membranes 1: blood on fresh wound, undetectable VL	
No information	2	
Total		56

Table 2

HIV-positive source patients: evaluation of exposure risk	
Increased risk	2: sharps injuries, detectable VL
No risk	6: blood on intact skin 3: sharps injuries, undetectable VL 3: potential-risk fluids, undetectable VL 3: no-risk fluids on mucous membranes
Total	17

CONCLUSIONS

- The low incidence of high risk exposures (n=16, 1%) over 6 years across three hospitals is reassuring.
- However, this should not result in a reduction of post-exposure evaluations: early intervention can prevent HIV and HBV infection, and early HCV detection results in better treatment outcome.
- The high rate of exposures that could be considered as no risk (55%) implies a high rate of distress reduction for exposed healthcare workers. Some of the exposures could be immediately discarded as no risk. To those six HIV- and 10 HCV-exposed individuals where negative VL defined the "no risk"- status, PEP respectively an intensified laboratory evaluation were still offered as an option.
- Considerably more exposures were reported in source patients with HCV than HIV. This likely reflects the disease prevalence in the Swiss population (HCV: 0,7-1%, HIV 0,3%).
- Underreporting in exposures "self-evaluated" as no risk might explain the higher rate of reported skin/mucous membrane exposures in HIV/HCV patients (43% versus 15% overall).
- The high rate of HBV immunity in personnel reduced the number of HBV tests in source patients.

Literature

1. MacCannell et al. *Clin Liver Dis* 2010
2. FitzSimons et al. *Occup Environ Med* 2008
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4. Deuffic-Burban et al. *J Clin Virol* 2011
5. In analogy to the „negligibly small“ risk for sexual transmission of HIV under defined conditions in successfully treated patients („Swiss statement“), Vernazza et al. *Schweiz Ärztztzgt* 2008