Surveillance of exposure to blood-borne viruses (HIV, HBV, HCV) and its management 1999 - 2014

Special Preventive Programme
Centre for Health Protection
Department of Health
December 2016

Correspondence

Therapeutic Prevention Clinic
Integrated Treatment Centre
Special Preventive Programme
8/F, Kowloon Bay Health Centre
9 Kai Yan Street
Kowloon,
HONG KONG.

Telephone: (852) 2116 2929
Facsimile: (852) 2117 0809

*The pdf version of this report can be downloaded from www.aids.gov.hk

CONTENTS

COMMENTARY

Background

1. Human immunodeficiency virus (HIV) is transmitted by three modes: sexual contact, blood-borne contact and mother-to-child. While blood-borne transmission essentially refers to sharing of needles/syringes among injecting drug users, HIV infection resulting from exposure in health care setting did rarely occur. Small but genuine, the risk of contracting HIV after percutaneous and mucosal exposures to HIV-contaminated blood is 0.3% [1] and 0.09% respectively. [2] Besides, blood-borne hepatitis, notably hepatitis B (HBV) and hepatitis C (HCV), are of concern after occupational exposure.

2. The first case of documented HIV seroconversion after occupational exposure was reported in 1984 in a UK health care worker (HCW). [3] Worldwide, with data censored up to the end of 2002, there were a total of 106 documented and 238 possible occupationally acquired HIV cases. [4] The occurrence of hepatitis B and C related to health care could have been more common, in view of their higher transmission risk. After percutaneous or mucosal contact, the risk of HBV infection after a percutaneous injury in the health care setting is 6-30% [5] and that of HCV 0-10%. [6]

3. Risk assessment, counselling and health advice are of the utmost importance in post exposure management. This applies to both occupational and non-occupational exposure, the latter of which happens in community settings. Baseline and follow-up blood investigations are necessary to document the incident and its outcome, as well as inform and monitor specific interventions, if any. At present, hepatitis B immunoglobulin (HBIg) and vaccine are available to reduce the risk of HBV transmission after exposure. Antiretroviral drugs can be employed as post exposure prophylaxis (PEP) for HIV but no effective preventive intervention exists for HCV.

Surveillance of occupational and non-occupational exposure

4. In view of the significance and implication of exposure to blood-borne pathogens, many countries have set up surveillance mechanisms for exposure to blood-borne viruses (BBV), usually focusing on HIV, HBV and HCV. For example,

UK has developed a web-based sentinel surveillance system that collects information on occupational exposures in HCW as they occur, to provide epidemiological information on risk of BBV transmission in the healthcare setting. [7] The US Centers for Disease Control and Prevention (CDC) also takes stock of the number of HCWs who definitively or probably contracted HIV after a history of occupational exposure.

5. In Hong Kong, the Accident & Emergency (A&E) Department is by far the commonest service provider to whom clients with potential exposure to BBVs will first present. However, as post exposure management requires longer term follow up, the clients are often referred to designated institutions after first aid and immediate care at A&E Departments. One such clinic is the Therapeutic Prevention Clinic (TPC) of Integrated Treatment Centre (ITC), Centre for Health Protection of the Department of Health. Since its operation in mid-1999, TPC has been monitoring the characteristics and outcome of clients referred for its care. Albeit far from ideal, the data collected may shed some light on the local pattern of exposure to BBVs.

6. On a referral basis, the TPC provides post exposure care for people with documented percutaneous, mucosal or breached skin exposure to blood/body fluids, which could have therapeutic and/or diagnostic implications for HIV or viral hepatitis B and C. Doctors and nurses are the key health professionals staffing the clinic. After the initial consultation and work up, clients are offered clinic revisits to have follow up blood investigations. Management with PEP or HBIg will be initiated or continued where indicated.

7. Integrating into the care protocol was collection of three aspects of information with standard questionnaires by the attending nurse and doctor: (a) first consult assessment of the client and exposure, (b) HIV, HBV and HCV serology, and (c) HIV post exposure prophylaxis. Assessment at first consultation includes demography and occupation of the exposed person, type of the injury/exposure, source person, risk of the exposure, and PEP. All exposures are grouped under two categories: (i) HCW with occupational exposure - category A, and (ii) all other exposure cases - category B. To determine BBV seroconversion after the exposure, baseline and subsequent serology are checked for as far as possible. The prescription and outcome of HIV PEP is also specifically followed in line with international practice. Collected data are reviewed at quarterly intervals. A previous report

presented the observations and analysis of data from mid-1999 to 2004. This update report extends the coverage to 2014.

Types and pattern of exposure

8. Since mid-1999, TPC has been seeing some 300-500 clients referred for post exposure management each year. Overall, about one-quarter were healthcare workers who had sustained exposure in the health care setting. From 2004 onwards, the number of healthcare workers referred decreased from around 120-160/ year to less than 100/year. At the same time, the number of non-healthcare workers referred rose gradually over the years. As shown in Table 2, dental professionals accounted for the bigger proportion of HCW referred for care. This may be related to their job nature and hence higher frequency of occupational exposure. Nurses were second, and the ward/clinic ancillary staff came third. Over the years, the number of dental professionals referred to TPC showed an increasing trend whereas that of nurses declined. On the other hand, among other exposure cases, institutional staff comprised the most frequent group of workers. They slightly outnumbered cleansing staff referred to TPC.

9. The exposed persons spanned a wide range of age. For HCW with occupational exposure, they were mostly (nearly 60%) in the age group of 25-44 years (Table 3). Clients belonging to all other exposures were generally older, about half of whom were between 35 and 54 years of age. This is expected as the latter clients were more heterogeneous, including those from the general public while the former was in the healthcare workforce. There were more females attending for post exposure management, in particular for category A clients.

10. Over half of both categories of clients sustained exposure from 8 am to 4 pm of the day (Table 4). More clients in category B had injury in other time periods, especially for 12 midnight to 8 am, when compared to category A clients. The majority of clients in category A attended for their first medical consultation between 8 am to 4 pm. There were slightly more category B clients seeking consultation for the exposure in hours other than 8 am to 4 pm. Over 60% of the HCW with occupational exposure worked in public hospitals/clinics/laboratories (Table 5). For all other exposure cases, most sustained exposure in their workplace or public areas. Percutaneous injury was the commonest type of exposure, accounting for 88.7% in

category A and 55% in category B clients (Table 6). Human bite was also a common mode of exposure in category B clients, accounting for about 35% of all cases. Mucosal exposure excluding sexual contact was exceedingly uncommon among our clients, occurring in 3.5% of HCW with occupational exposure and 2.2% in category B clients. Sexual exposure accounted for 2.9% of category B only, yet this has been increasing since 2007 onwards. Around 80% of all exposures were assessed to be superficial, which is similar for both categories of clients (Table 7). The exposure source could be identified in 84.1% of the category A exposures, higher than that for category B clients (61.7%) (Table 8). At the time of first consultation at TPC, 7.5% and 4.2% of the identified sources were known to be HBsAg positive for category A and category B clients respectively. The known anti-HCV and anti-HIV positivity rates were 1.6% and 3.3% among identified sources of category A clients, which were also higher than the corresponding figures for category B clients. Nevertheless, they did not represent the underlying prevalence of blood-borne pathogens in the populations, due to biased sampling and the small number of cases.

11. Amongst HCW who sustained occupational exposure, over 60% occurred under four situations: (a) blood-taking/intravenous catheter insertion, (b) injection including recapping of needles, (c) other bedside/treatment room procedures and (d) cleansing/tidying up after procedures (which was the commonest) (Table 9). About 36% of category A exposures were with blood or blood-contaminated fluids. Hollow-bore needles were implicated in nearly half of the cases while dental instrument and lancet were the other common specific technical device relating to exposure. The frequency of respective activity/procedure contributing to the exposures in medical/dental health professionals were similar to the overall scenario (Table 10). For nursing professionals, injection including needle recapping was the most important activity/procedure leading to exposure (Table 11). The specific settings of injury/exposure in the health professionals somewhat reflected their work nature.

12. Taking reference of a case-control study which identified risk factors associated with higher likelihood of HIV transmission after percutaneous injury, [8] we deemed five specific factors to underlie higher risk exposure: deep percutaneous injury, procedures with device placed in a blood vessel, involvement of a hollow-bore needle, device which is visibly contaminated with blood, and source person with AIDS. On a second level which is considered lower risk but still risky, there are also

five factors: moderate percutaneous injury, mucosal contact, contact with deep body fluids other than blood, source person being HIV infected without AIDS or with unclear disease stage, and other reasons contributing to an increased risk. Under this assessment framework, 56.1% of all the occupational exposures in HCW were classified to be higher risk (Table 12). Some 11% belonged to lower risk. The vast majority of the clients with either higher or lower risk exposure had one risk factor out of the five (Table 13). Examining the procedures involved, we found that only blood-taking/intravenous catheter insertion had ever resulted in client exposures with 4 factors. The mean number of risk factors was also the highest at 1.29 (95% confidence interval, 1.18-1.4) for blood-taking/ intravenous catheter insertion (Table 14). Glove usage among HCWs sustaining occupational exposure to blood or body fluids has risen from less than half before 2003 to around 70% (Table 15) in recent years, likely a result of heightened awareness. However, the use of other protective equipment remained infrequent.

Care, HIV post-exposure prophylaxis and outcome

13. Cumulatively, 46% of category A clients attended medical consultation within 2 hours of exposure; another 37% between 2 and 12 hours (Table 16). Consultation for exposure was less prompt for category B clients. The median time lag was 2.0 hours and 3.0 hours for category A and category B clients respectively. Baseline blood test was routinely done to assess the susceptibility of clients to BBVs, necessity of intervention and document status prior to injury. As expected, hepatitis B was the most common infection present before exposure. Some 4.9 % and 7.5% of category A and B clients respectively had positive HBsAg at baseline (Table 17). In particular, of the cleansing workers with occupational exposures, HBsAg positivity rates were at 10.3%, as most of them had been born before universal hepatitis B vaccination programme in infants was in place. Nor did they generally benefit from employment vaccination as HCW. Some 53-73% of the two categories had anti-HBs. It was not surprising that HBV markers were more prevalent in HCWs, likely a result of hepatitis B vaccination and increased exposure risk from work. Hepatitis C antibody was only found in 7 (0.4%) of category B clients but not in HCWs. Only 1 client in category B was HIV-infected at baseline.

14. Over the 15.5years covered for this report, a total of 213 subjects had been put on HIV PEP, corresponding to 3.1% and 3.5% of category A and B clients

respectively (Table 18). In those with high risk exposures requiring PEP and with known data, percutaneous injury (80%) was the most common underlying mechanism in category A. For category B, 62% of the PEP prescriptions were for sexual exposures, and percutaneous exposures accounted for 28.8% (Table 30). The number of prescriptions of HIV PEP to category A clients remained relatively stable over the years. However, PEP prescribed to category B clients has surged in more recent years, the rise being contributed by sexually exposed clients requiring PEP. Over 90% of these sexually exposed clients requiring PEP were male, with a median age of 31 years old. Their sex partners were known to be HIV positive in 39.5% of cases.

15. Administration of PEP to category A clients was more prompt than to category B clients, with an overall median time of 4.1 and 18.1 hours after exposure respectively (Table 19). For clients of category A given PEP, 32% and 86% were able to initiate it within 2 hours and 24 hours after exposure respectively. However, the corresponding figures for category B clients were 4.9% and 62%. Comparatively, slightly more category A clients (76%) were continued on HIV PEP at TPC than category B clients (67.5%) (Table 20). The phenomenon might be due to the relatively standard assessment and management protocol for exposures in the health care setting. The more heterogenous nature and circumstances of exposure for category B clients could explain why treatment was not continued for some clients after further assessment and counselling.

16. The majority of clients in both categories who were continued on PEP at TPC had known outcome upon follow up. Of these subjects, most were put on 3 drugs (two nucleoside reverse transcriptase inhibitor, NRTI, plus one protease inhibitor, PI) instead of 2 NRTIs alone – 86.5% in category A and 95.1% in category B (Table 22). Irrespective of the number of drugs of the PEP regimen, occurrence of adverse effects was common at 73-87% for clients of both categories. (Table 23). Overall, moderate to severe drug toxicity was encountered in around half of category A clients and around one-quarter of category B clients. PEP was completed in around half and over 80% of the clients in category A and category B respectively (Table 24). Eight (21.6%) HCWs stopped PEP because of adverse effects and 9 (24.3%) stopped PEP after the source had been established HIV negative (Table 26). On the contrary, less category B clients ceased PEP early because of drug toxicity (11.7%) or the source having been established HIV negative (1.9%). The median duration of intake of drugs

was 28 days for both groups i.e. completion of the whole course of post exposure prophylaxis (Table 25).

17. From mid-1999 to 2014, there was no HIV, HBV, or HCV seroconversion among HCW with occupational exposures (Table 28). For all other exposures, one (0.02%) client developed HBV seroconversion after percutaneous injury by a discarded needle in the community. Another sexually exposed client (0.02%) developed HIV seroconversion. There was no HCV seroconversion in category B.

18. Source persons were confirmed to be HIV infected for 15 category A and 43 category B exposures with known outcome over the years (Table 27). All of the subjects received HIV PEP, with a median time lag of four hours in category A and 22 hours in category B. Forty percent and 80% of category A clients received PEP within 2 and 24 hours of exposure respectively, while the corresponding figures for category B clients were 7.0% and 60.5%. PEP completion rates were similar for both categories at 84 and 87%.

Discussion

19. Transmission of BBVs to HCWs is an occupational hazard which can lead to serious consequences. Fortunately, the risk is extremely low with appropriate precautions and work practice. Pre-exposure vaccination and post exposure prophylaxis further decrease the risk for some of the infections. Overseas, guidelines are in place to guide the management, including use of PEP, after occupational exposure to HIV, HBV and HCV in health care settings [9-11], as well as in non-occupational situations such as sexual exposure and injection drug use.[12, 13] In 2014, the World Health Organization (WHO) issued consolidated recommendations for HIV post exposure prophylaxis irrespective of exposure source. [14] Locally, the importance of prevention and transmission of BBVs after exposure is well recognised. Guidelines and recommendations have also been developed to assist patient management. [15-17]

20. It is prudent to keep track of the extent and impact of exposure to BBVs in occupational and non-occupational settings. Over the last 15 years, as a surveillance effort, we have tried to gauge the trends of exposure, baseline and follow up BBV serologic markers and details of PEP for the clients who attended TPC. The objectives

are to follow the trend of exposure, discern characteristics of client and exposure, and hopefully contribute to preventive measures to reduce and better manage such incidents in future. While exposure in the health care setting was usually better defined, exposure in the community is highly variable. Nevertheless, the basic principles of risk assessment of the exposure, counselling, psychological support and investigations should apply to all kinds of exposure. In line with basic medical principles, it is also necessary to have case-by-case assessment and tailored management for clients.

21. We examined all clients and not only those exposed to positive BBVs sources in the analysis. The overall risk could thus be an underestimate for some of the clients. The fact that the status of BBV in many sources being unknown adds to the difficulty. Even when the source person was known the source person was often not available for virologic testing. Nevertheless, in cases where the source person has unknown HIV status but from a setting with high HIV prevalence, PEP may still be indicated after receptive anal sex (UK guideline) and following exposures with substantial risks (WHO guideline). Individual assessment is essential in these scenarios. For completeness of data our monitoring covers all clients who attended TPC for post-exposure care.

22. We found that a variety of health care workers were implicated in occupational exposure to potential BBV, albeit a greater number of some professions were involved. Percutaneous injury was the most frequent exposure, and also one with a higher risk. Sharps handling should therefore be viewed as one of the most important elements linked to exposure. This can occur during patient procedures or after care. Many of these blood or body fluid exposures were potentially preventable, by virtue of using needles with safety device or employing safer work practice, such as appropriate use of personal protective equipment and avoiding recapping of needles. Regular job training on importance of adherence to infection control practices should be given to newly-recruited HCW as well as other staff.

23. For all other exposures, percutaneous exposure remained the most common reason for referral for post exposure management in TPC, followed by human bite. Although sexual exposure accounted for a small proportion of the referrals, it has become the predominant cause for PEP prescription in TPC in the recent years. Most

of these clients who required PEP were young male. The relatively high known HIV positivity rate of their source persons was alarming and reflected a genuine risk of HIV transmission in these exposures. Although the evidence for PEP after sexual exposures came mainly from observational studies and animal studies, it has been recommended by different guidelines, especially following receptive and insertive anal sex, and receptive vaginal sex.[12,13] The escalating number of PEP prescriptions for sexual exposures in ITC provided a glimpse of the increasing demand for PEP following high risk sexual exposures in this group. Further analysis of the characteristics of these clients who engaged in high risk sexual activity may guide specific preventive strategies. Non-occupational PEP should be combined with other measures, such as risk reduction counselling, promotion of condom use, and other means of biomedical prevention etc., to reduce HIV transmission effectively.

24. Generally speaking, exposed clients presented for medical attention quite quickly. As first line carers of clients with exposure to BBVs, the A&E Departments in Hong Kong have in place internal guidelines for management. [17] On the whole, prescription of HIV PEP was not common. Stocking starter pack antiretrovirals at A&E Department has improved the promptness of treatment when indicated. Indeed, most of the clients who required PEP were able to initiate treatment within 24 hours of exposure. HIV PEP was started for clients with exposures of the highest risks, including all of the exposures with known HIV positive sources, and to other 35 and 120 healthcare workers with occupational exposure and clients with other exposures respectively. Among those initiated on HIV PEP, a significant proportion of them did not complete the 28-day course of treatment. Similar to overseas reports, drug intolerance and toxicity was a key factor leading to discontinuation of PEP. As newer antiretrovirals become available for PEP, drug tolerance and adherence are expected to improve in the future.

25. There have been no cases of documented seroconversion after occupational exposure to HIV, HBV or HCV from this cohort. HIV seroconversion was extremely rare in healthcare settings in developed countries in the past decade, but HCV seroconversion sometimes occurred [7, 18]. For all other exposures, we reported a case of HBV seroconversion after needlestick injury by a discarded needle in the community. Another client with sexual exposure developed HIV seroconversion despite completion of PEP. He admitted to have ongoing sexual exposures, and his

HIV antibody test was negative at 3 months post exposure but turned positive at 6 months. Thus, it was likely due to repeated sexual exposure rather than PEP failure. Transmission of blood borne viruses via discarded needles was extremely uncommon. Worldwide, there were only three reported cases each of HBV and HCV infection and no documented case of HIV seroconversion from non-healthcare associated needlestick injuries. [19] In contrast, sexual exposure may be a more common route of HIV transmission. HIV seroconversion following sexual exposures despite PEP use has been well documented. [20,21]

26. There were several limitations to our findings. Our data comes from a single centre only, and is based on secondary referral. Many factors could have influenced whether clients attend or not attend our clinic. Hence, the data could not be generalised to all exposures in Hong Kong in this period of time. As a result, the exact dimension of the issue cannot be ascertained using our data alone. It would likely be useful to collect information also from primary care institutions, i.e. the A&E Departments. While we examined the characteristics and pattern of exposure from cases referred to us, we did not factor in the denominator either, i.e. number of HCWs of each healthcare workforce in our analysis. The extent of the problem within different health professions would be better analysed in such way. Also, even though data has been collected with standardised template, the presence of inter-observer and intra-observer bias may still exist and affect data consistency. Lastly, the exposure and the source details were reported by the clients attending TPC. These could be subject to recall bias, affecting the accuracy of the data.

Table 1. Number of incidents with possible viral exposure and referred to attend Therapeutic Prevention Clinic, ITC, CHP, DH (mid 1999-2014)

	A. Health care workers with occupational exposure	B. All other exposure cases	Total
1999 (Jul-Dec)	30	99	129
2000	122	266	388
2001	168	380	548
2002	154	295	449
2003	157	231	388
2004	97	222	319
2005	92	238	330
2006	88	319	407
2007	100	271	371
2008	86	264	350
2009	75	330	405
2010	80	290	370
2011	78	314	392
2012	96	358	454
2013	102	348	450
2014	98	371	469
Total	1623	4596	6219

Table 2. Profession of the exposed persons

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Nursing profession	21 (70.0%)	51 (41.8%)	73 (43.5%)	64 (41.6%)	65 (41.4%)	26 (26.8%)	32 (34.8%)	20 (22.7%)	18 (18.0%)	15 (17.4%)	13 (17.3%)	21 (26.3%)	24 (30.8%)	31 (32.3%)	36 (35.3%)	25 (25.5%)	535 (33.0%)
Dental profession	6 (20.0%)	26 (21.3%)	41 (24.4%)	29 (18.8%)	29 (18.5%)	39 (40.2%)	45 (48.9%)	44 (50.0%)	55 (55.0%)	44 (51.2%)	41 (54.7%)	37 (46.3%)	31 (39.7%)	51 (53.1%)	43 (42.2%)	42 (42.9%)	603 (37.2%)
Medical profession	1 (3.3%)	5 (4.1%)	12 (7.1%)	9 (5.8%)	11 (7.0%)	4 (4.1%)	3 (3.3%)	4 (4.5%)	4 (4.0%)	5 (5.8%)	1 (1.3%)	2 (2.5%)	4 (5.1%)	2 (2.1%)	5 (4.9%)	11 (11.2%)	83 (5.1%)
Ward/clinic ancillary staff (5+6)	0 (0.0%)	25 (20.5%)	23 (13.7%)	29 (18.8%)	27 (17.2%)	13 (13.4%)	3 (3.3%)	6 (6.8%)	6 (6.0%)	7 (8.1%)	11 (14.7%)	13 (16.3%)	4 (5.1%)	1 (1.0%)	9 (8.8%)	3 (3.1%)	180 (11.1%)
Others	2 (6.7%)	15 (12.3%)	19 (11.3%)	23 (14.9%)	25 (15.9%)	15 (15.5%)	9 (9.8%)	14 (15.9%)	17 (17.0%)	15 (17.4%)	9 (12.0%)	7 (8.8%)	15 (19.2%)	11 (11.5%)	9 (8.8%)	17 (17.3%)	222 (13.7%)
B. All other exposure cases																	
Cleansing staff	28 (28.3%)	67 (25.2%)	77 (20.3%)	76 (25.8%)	63 (27.3%)	45 (20.3%)	52 (21.8%)	69 (21.6%)	44 (16.2%)	41 (15.5%)	50 (15.2%)	41 (14.1%)	42 (13.4%)	63 (17.6%)	37 (10.6%)	43 (11.6%)	838 (18.2%)
Disciplinary staff	18 (18.2%)	29 (10.9%)	36 (9.5%)	29 (9.8%)	38 (16.5%)	25 (11.3%)	30 (12.6%)	29 (9.1%)	22 (8.1%)	20 (7.6%)	33 (10.0%)	28 (9.7%)	20 (6.4%)	38 (10.6%)	33 (9.5%)	32 (8.6%)	460 (10.0%)
Institution staff	7 (7.1%)	18 (6.8%)	26 (6.8%)	35 (11.9%)	33 (14.3%)	49 (22.1%)	49 (20.6%)	81 (25.4%)	74 (27.3%)	76 (28.8%)	83 (25.2%)	64 (22.1%)	77 (24.5%)	94 (26.3%)	85 (24.4%)	106 (28.6%)	957 (20.8%)
Others	46 (46.5%)	152 (57.1%)	241 (63.4%)	155 (52.5%)	97 (42.0%)	103 (46.4%)	107 (45.0%)	140 (43.9%)	131 (48.3%)	127 (48.1%)	164 (49.7%)	157 (54.1%)	174 (55.4%)	163 (45.5%)	193 (55.5%)	190 (51.2%)	2340 (50.9%)

Table 3. Gender and age of the exposed persons

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Male	7 (23.3%)	25 (20.5%)	36 (21.4%)	36 (23.4%)	45 (28.7%)	34 (35.1%)	19 (20.7%)	24 (27.3%)	25 (25.0%)	22 (25.6%)	9 (12.0%)	9 (11.3%)	22 (28.2%)	20 (20.8%)	18 (17.6%)	26 (26.5%)	377 (23.2%)
Female	23 (76.7%)	97 (79.5%)	132 (78.6%)	118 (76.6%)	112 (71.3%)	63 (64.9%)	73 (79.3%)	64 (72.7%)	75 (75.0%)	64 (74.4%)	66 (88.0%)	71 (88.8%)	56 (71.8%)	76 (79.2%)	84 (82.4%)	72 (73.5%)	1246 (76.8%)
Age (Years)																	
<15	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
15-24	3 (10.0%)	22 (18.0%)	33 (19.6%)	36 (23.4%)	25 (15.9%)	20 (20.6%)	19 (20.7%)	20 (22.7%)	20 (20.0%)	26 (30.2%)	12 (16.0%)	13 (16.3%)	18 (23.1%)	28 (29.2%)	35 (34.3%)	32 (32.7%)	362 (22.3%)
25-34	8 (26.7%)	39 (32.0%)	57 (33.9%)	45 (29.2%)	46 (29.3%)	25 (25.8%)	23 (25.0%)	33 (37.5%)	31 (31.0%)	25 (29.1%)	17 (22.7%)	24 (30.0%)	22 (28.2%)	32 (33.3%)	37 (36.3%)	35 (35.7%)	499 (30.7%)
35-44	16 (53.3%)	38 (31.1%)	55 (32.7%)	39 (25.3%)	56 (35.7%)	40 (41.2%)	34 (37.0%)	25 (28.4%)	34 (34.0%)	18 (20.9%)	20 (26.7%)	21 (26.3%)	16 (20.5%)	15 (15.6%)	17 (16.7%)	20 (20.4%)	464 (28.6%)
45-54	3 (10.0%)	20 (16.4%)	22 (13.1%)	28 (18.2%)	26 (16.6%)	10 (10.3%)	16 (17.4%)	8 (9.1%)	12 (12.0%)	17 (19.8%)	18 (24.0%)	19 (23.8%)	19 (24.4%)	17 (17.7%)	11 (10.8%)	9 (9.2%)	255 (15.7%)
>55	0 (0.0%)	3 (2.5%)	1 (0.6%)	6 (3.9%)	4 (2.5%)	2 (2.1%)	0 (0.0%)	2 (2.3%)	3 (3.0%)	0 (0.0%)	8 (10.7%)	3 (3.8%)	3 (3.8%)	4 (4.2%)	2 (2.0%)	2 (2.0%)	43 (2.6%)
B. All other exposure cases																	
Male	54 (54.5%)	135 (50.8%)	177 (46.6%)	123 (41.7%)	100 (43.3%)	101 (45.5%)	97 (40.8%)	112 (35.1%)	109 (40.2%)	105 (39.8%)	138 (41.8%)	104 (35.9%)	119 (37.9%)	135 (37.7%)	151 (43.4%)	141 (38.0%)	1901 (41.4%)
Female	45 (45.5%)	131 (49.2%)	203 (53.4%)	172 (58.3%)	131 (56.7%)	121 (54.5%)	141 (59.2%)	207 (64.9%)	162 (59.8%)	159 (60.2%)	192 (58.2%)	186 (64.1%)	195 (62.1%)	223 (62.3%)	197 (56.6%)	230 (62.0%)	2695 (58.6%)
Age (Years)																	
<15	5 (5.1%)	20 (7.5%)	19 (5.0%)	14 (4.7%)	0 (0.0%)	3 (1.4%)	15 (6.3%)	3 (64.9%)	17 (0.0%)	12 (4.5%)	9 (2.7%)	9 (3.1%)	12 (3.8%)	4 (1.1%)	13 (3.7%)	7 (1.9%)	162 (3.5%)
15-24	10 (10.1%)	54 (20.3%)	86 (22.6%)	38 (12.9%)	34 (14.7%)	33 (14.9%)	24 (10.1%)	43 (13.5%)	26 (9.6%)	35 (13.3%)	40 (12.1%)	49 (16.9%)	45 (14.3%)	48 (13.4%)	58 (16.7%)	61 (16.4%)	684 (14.9%)
25-34	25 (25.3%)	40 (15.0%)	77 (20.3%)	60 (20.3%)	54 (23.4%)	57 (25.7%)	54 (22.7%)	61 (19.1%)	47 (17.3%)	40 (15.2%)	75 (22.7%)	58 (20.0%)	75 (23.9%)	79 (22.1%)	72 (20.7%)	95 (25.6%)	969 (21.1%)
35-44	32 (32.3%)	68 (25.6%)	81 (21.3%)	74 (25.1%)	52 (22.5%)	60 (27.0%)	47 (19.7%)	82 (25.7%)	81 (29.9%)	75 (28.4%)	90 (27.3%)	59 (20.3%)	62 (19.7%)	73 (20.4%)	80 (23.0%)	63 (17.0%)	1079 (23.5%)
45-54	17 (17.2%)	56 (21.1%)	72 (18.9%)	76 (25.8%)	74 (32.0%)	53 (23.9%)	75 (31.5%)	90 (28.2%)	68 (25.1%)	71 (26.9%)	67 (20.3%)	75 (25.9%)	74 (23.6%)	91 (25.4%)	66 (19.0%)	75 (20.2%)	1100 (23.9%)
>55	10 (10.1%)	28 (10.5%)	45 (11.8%)	33 (11.2%)	17 (7.4%)	16 (7.2%)	23 (9.7%)	40 (12.5%)	32 (11.8%)	31 (11.7%)	49 (14.8%)	40 (13.8%)	46 (14.6%)	63 (17.6%)	59 (17.0%)	70 (18.9%)	602 (13.1%)
Median age	37	38	35	40	40	39	39.5	41	41	41	39	40	38	41	38	--	39

Table 4. Timing of exposure and medical consultation

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Time of injury																	
A. Health care workers with occupational exposure																	
12MN - 8am	4 (13.3%)	11 (9.0%)	21 (12.5%)	11 (7.1%)	14 (8.9%)	2 (2.1%)	6 (6.5%)	3 (3.4%)	4 (4.0%)	4 (4.7%)	3 (4.0%)	3 (3.8%)	3 (3.8%)	5 (5.2%)	2 (2.0%)	6 (6.1%)	102 (6.3%)
8am - 4pm	21 (70.0%)	76 (62.3%)	96 (57.1%)	93 (60.4%)	98 (62.4%)	67 (69.1%)	63 (68.5%)	54 (61.4%)	68 (68.0%)	60 (69.8%)	45 (60.0%)	59 (73.8%)	50 (64.1%)	56 (58.3%)	72 (70.6%)	60 (61.2%)	1038 (64.0%)
4pm - 12MN	5 (16.7%)	35 (28.7%)	51 (30.4%)	50 (32.5%)	45 (28.7%)	28 (28.9%)	23 (25.0%)	31 (35.2%)	28 (28.0%)	22 (25.6%)	27 (36.0%)	18 (22.5%)	25 (32.1%)	35 (36.5%)	28 (27.5%)	32 (32.7%)	483 (29.8%)
B. All other exposure cases																	
12MN - 8am	12 (12.1%)	49 (18.4%)	64 (16.8%)	42 (14.2%)	37 (16.0%)	29 (13.1%)	25 (10.5%)	50 (15.7%)	48 (17.7%)	46 (17.4%)	53 (16.1%)	39 (13.4%)	43 (13.7%)	59 (16.5%)	58 (16.7%)	50 (13.5%)	704 (15.3%)
8am - 4pm	54 (54.5%)	140 (52.6%)	185 (48.7%)	149 (50.5%)	119 (51.5%)	111 (50.0%)	126 (52.9%)	158 (49.5%)	133 (49.1%)	126 (47.7%)	159 (48.2%)	156 (53.8%)	154 (49.0%)	174 (48.6%)	168 (48.3%)	177 (47.7%)	2289 (49.8%)
4pm - 12MN	33	77	131	104	75	82	87	111	90	92	118	95	117	122	122	143	1599
Time of first medical consultation	(33.3%)	(28.9%)	(34.5%)	(35.3%)	(32.5%)	(36.9%)	(36.6%)	(34.8%)	(33.2%)	(34.8%)	(35.8%)	(32.8%)	(37.3%)	(34.1%)	(35.1%)	(38.5%)	(34.8%)
A. Health care workers with occupational exposure																	
12MN - 8am	1 (3.3%)	8 (6.6%)	7 (4.2%)	11 (7.1%)	12 (7.6%)	2 (2.1%)	2 (2.2%)	7 (8.0%)	1 (1.0%)	2 (2.3%)	3 (4.0%)	1 (1.3%)	4 (5.1%)	6 (6.3%)	2 (2.0%)	6 (6.1%)	75 (4.6%)
8am - 4pm	25 (83.3%)	78 (63.9%)	96 (57.1%)	87 (56.5%)	86 (54.8%)	55 (56.7%)	58 (63.0%)	48 (54.5%)	61 (61.0%)	45 (52.3%)	35 (46.7%)	47 (58.8%)	40 (51.3%)	46 (47.9%)	51 (50.0%)	39 (39.8%)	897 (55.3%)
4pm - 12MN	4 (13.3%)	36 (29.5%)	65 (38.7%)	56 (36.4%)	59 (37.6%)	40 (41.2%)	32 (34.8%)	33 (37.5%)	38 (38.0%)	39 (45.3%)	37 (49.3%)	32 (40.0%)	34 (43.6%)	43 (44.8%)	49 (48.0%)	51 (52.0%)	648 (39.9%)
B. All other exposure cases																	
12MN - 8am	10 (10.1%)	22 (8.3%)	45 (11.8%)	31 (10.5%)	27 (11.7%)	18 (8.1%)	17 (7.1%)	38 (11.9%)	37 (13.7%)	35 (13.3%)	37 (11.2%)	32 (11.0%)	32 (10.2%)	57 (15.9%)	56 (16.1%)	44 (11.9%)	538 (11.7%)
8am - 4pm	46 (46.5%)	138 (51.9%)	194 (51.1%)	133 (45.1%)	109 (47.2%)	96 (43.2%)	101 (42.4%)	120 (37.6%)	100 (36.9%)	113 (42.8%)	141 (42.7%)	121 (41.7%)	129 (41.1%)	144 (40.2%)	124 (35.6%)	137 (36.9%)	1946 (42.3%)
4pm - 12MN	43 (43.4%)	106 (39.8%)	141 (37.1%)	131 (44.4%)	95 (41.1%)	108 (48.6%)	120 (50.4%)	161 (50.5%)	134 (49.4%)	116 (43.9%)	152 (46.1%)	137 (47.2%)	153 (48.7%)	156 (43.6%)	168 (48.3%)	190 (51.2%)	2111 (45.9%)

Table 5. Setting/location of the exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Public hospital	6 (20.0%)	49 (40.2%)	70 (41.7%)	73 (47.4%)	83 (52.9%)	25 (25.8%)	14 (15.2%)	16 (18.2%)	13 (13.0%)	18 (20.9%)	8 (10.7%)	7 (8.8%)	15 (19.2%)	13 (13.5%)	22 (21.6%)	15 (15.3%)	447 (27.5%)
Private hospital	1 (3.3%)	0 (0.0%)	2 (1.2%)	0 (0.0%)	2 (1.3%)	2 (2.1%)	2 (2.2%)	1 (1.1%)	1 (1.0%)	1 (1.2%)	4 (5.3%)	3 (3.8%)	2 (2.6%)	0 (0.0%)	2 (2.0%)	0 (0.0%)	23 (1.4%)
Public clinic/laboratory	20 (66.7%)	45 (36.9%)	58 (34.5%)	36 (23.4%)	39 (24.8%)	35 (36.1%)	46 (50.0%)	26 (29.5%)	43 (43.0%)	30 (34.9%)	29 (38.7%)	43 (53.8%)	18 (23.1%)	35 (36.5%)	16 (15.7%)	23 (23.5%)	542 (33.4%)
Private clinic/laboratory	1 (3.3%)	5 (4.1%)	13 (7.7%)	11 (7.1%)	5 (3.2%)	15 (15.5%)	16 (17.4%)	17 (19.3%)	10 (10.0%)	17 (19.8%)	13 (17.3%)	11 (13.8%)	9 (11.5%)	20 (20.8%)	22 (21.6%)	20 (20.4%)	205 (12.6%)
Others	2 (6.7%)	23 (18.9%)	25 (14.9%)	34 (22.1%)	28 (17.8%)	20 (20.6%)	14 (15.2%)	28 (31.8%)	33 (33.0%)	20 (23.3%)	21 (28.0%)	16 (20.0%)	34 (43.6%)	28 (29.2%)	40 (39.2%)	40 (40.8%)	406 (25.0%)
B. All other exposure cases																	
Workplace of the exposure	63 (63.6%)	130 (48.9%)	156 (41.1%)	160 (54.2%)	138 (59.7%)	136 (61.3%)	144 (60.5%)	197 (61.8%)	161 (59.4%)	161 (61.0%)	166 (50.3%)	157 (54.1%)	158 (50.3%)	197 (55.0%)	154 (44.3%)	166 (44.7%)	2444 (53.2%)
Home	6 (6.1%)	22 (8.3%)	26 (6.8%)	30 (10.2%)	22 (9.5%)	19 (8.6%)	17 (7.1%)	39 (12.2%)	36 (13.3%)	23 (8.7%)	51 (15.5%)	29 (10.0%)	37 (11.8%)	35 (9.8%)	48 (13.8%)	37 (10.0%)	477 (10.4%)
Public area	28 (28.3%)	107 (40.2%)	185 (48.7%)	90 (30.5%)	54 (23.4%)	46 (20.7%)	59 (24.8%)	64 (20.1%)	52 (19.2%)	64 (24.2%)	87 (26.4%)	64 (22.1%)	83 (26.4%)	75 (20.9%)	65 (18.7%)	90 (24.3%)	1213 (26.4%)
Others	2 (2.0%)	7 (2.6%)	13 (3.4%)	15 (5.1%)	17 (7.4%)	21 (9.5%)	18 (7.6%)	19 (6.0%)	22 (8.1%)	16 (6.1%)	26 (7.9%)	40 (13.8%)	36 (11.5%)	51 (14.2%)	81 (23.3%)	78 (21.0%)	462 (10.1%)

Table 6. Nature of the exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Percutaneous	27 (90.0%)	96 (78.7%)	145 (86.3%)	142 (92.2%)	142 (90.4%)	92 (94.8%)	86 (93.5%)	77 (87.5%)	85 (85.0%)	80 (93.0%)	70 (93.3%)	72 (90.0%)	65 (83.3%)	87 (90.6%)	90 (88.2%)	83 (84.7%)	1439 (88.7%)
Mucosal, excluding sexual	0 (0.0%)	3 (2.5%)	2 (1.2%)	1 (0.6%)	5 (3.2%)	2 (2.1%)	3 (3.3%)	3 (3.4%)	10 (10.0%)	3 (3.5%)	0 (0.0%)	3 (3.8%)	5 (6.4%)	4 (4.2%)	6 (5.9%)	6 (6.1%)	56 (3.5%)
Non-intact skin	0 (0.0%)	7 (5.7%)	6 (3.6%)	2 (1.3%)	2 (1.3%)	0 (0.0%)	1 (1.1%)	3 (3.4%)	2 (2.0%)	2 (2.3%)	1 (1.3%)	1 (1.3%)	0 (0.0%)	2 (2.1%)	1 (1.0%)	1 (1.0%)	31 (1.9%)
Human bite	2 (6.7%)	9 (7.4%)	7 (4.2%)	9 (5.8%)	7 (4.5%)	2 (2.1%)	1 (1.1%)	5 (5.7%)	2 (2.0%)	1 (1.2%)	3 (4.0%)	3 (3.8%)	2 (2.6%)	3 (3.1%)	3 (2.9%)	4 (4.1%)	63 (3.9%)
Others	1 (3.3%)	7 (5.7%)	8 (4.8%)	0 (0.0%)	1 (0.6%)	1 (1.0%)	1 (1.1%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.3%)	1 (1.3%)	6 (7.7%)	0 (0.0%)	2 (2.0%)	4 (4.1%)	34 (2.1%)
B. All other exposure cases																	
Percutaneous	56 (56.6%)	165 (62.0%)	240 (63.2%)	179 (60.7%)	144 (62.3%)	131 (59.0%)	142 (59.7%)	170 (53.3%)	144 (53.1%)	123 (46.6%)	170 (51.5%)	154 (53.1%)	164 (52.2%)	196 (54.7%)	158 (45.4%)	192 (51.8%)	2528 (55.0%)
Mucosal, excluding sexual	0 (0.0%)	2 (0.8%)	1 (0.3%)	3 (1.0%)	5 (2.2%)	7 (3.2%)	5 (2.1%)	4 (1.3%)	9 (3.3%)	4 (1.5%)	5 (1.5%)	11 (3.8%)	9 (2.9%)	12 (3.4%)	14 (4.0%)	9 (2.4%)	100 (2.2%)
Non-intact skin	2 (2.0%)	8 (3.0%)	13 (3.4%)	4 (1.4%)	3 (1.3%)	4 (1.8%)	10 (4.2%)	15 (4.7%)	10 (3.7%)	11 (4.2%)	12 (3.6%)	10 (3.4%)	5 (1.6%)	8 (2.2%)	5 (1.4%)	6 (1.6%)	126 (2.7%)
Human bite	37 (37.4%)	84 (31.6%)	118 (31.1%)	102 (34.6%)	71 (30.7%)	72 (32.4%)	74 (31.1%)	121 (37.9%)	99 (36.5%)	114 (43.2%)	127 (38.5%)	106 (36.6%)	112 (35.7%)	123 (34.4%)	135 (38.8%)	135 (36.4%)	1630 (35.5%)
Other	4 (4.0%)	7 (2.6%)	8 (2.1%)	7 (2.4%)	8 (3.5%)	8 (3.6%)	7 (2.9%)	9 (2.8%)	9 (3.3%)	12 (4.5%)	16 (4.8%)	9 (3.1%)	24 (7.6%)	18 (5.0%)	36 (10.3%)	29 (7.8%)	211 (4.6%)

Table 7. Severity of the exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Superficial	29 (96.7%)	85 (69.7%)	120 (71.4%)	131 (85.1%)	142 (90.4%)	89 (91.8%)	84 (91.3%)	81 (92.0%)	80 (80.0%)	75 (87.2%)	65 (86.7%)	68 (85.0%)	60 (76.9%)	76 (79.2%)	78 (76.5%)	73 (74.5%)	1336 (82.3%)
Moderate	1 (3.3%)	32 (26.2%)	43 (25.6%)	20 (13.0%)	8 (5.1%)	5 (5.2%)	6 (6.5%)	4 (4.5%)	8 (8.0%)	8 (9.3%)	10 (13.3%)	9 (11.3%)	10 (12.8%)	17 (17.7%)	15 (14.7%)	19 (19.4%)	215 (13.2%)
Deep	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	2 (2.0%)	0 (0.0%)	3 (0.2%)
B. All other exposure cases																	
Superficial	87 (87.9%)	224 (84.2%)	313 (82.4%)	238 (80.7%)	189 (81.8%)	188 (84.7%)	209 (87.8%)	270 (84.6%)	216 (79.7%)	212 (80.3%)	269 (81.5%)	248 (85.5%)	230 (73.2%)	261 (72.9%)	225 (64.7%)	266 (71.7%)	3645 (79.3%)
Moderate	11 (11.1%)	40 (15.0%)	50 (13.2%)	46 (15.6%)	29 (12.6%)	26 (11.7%)	24 (10.1%)	34 (10.7%)	33 (12.2%)	34 (12.9%)	37 (11.2%)	22 (7.6%)	45 (14.3%)	65 (18.2%)	79 (22.7%)	70 (18.9%)	645 (14.0%)
Deep	1 (1.0%)	0 (0.0%)	0 (0.0%)	2 (0.7%)	0 (0.0%)	1 (0.5%)	2 (0.8%)	0 (0.0%)	3 (1.1%)	2 (0.8%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	2 (0.6%)	2 (0.6%)	2 (0.5%)	20 (0.4%)

Table 8. Reported status of blood-borne infections in identified sources of the incidents of exposure at initial consult

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Source identified																	
Known HBsAg positive	0 (0.0%)	11 (11.6%)	11 (7.7%)	5 (4.1%)	8 (5.9%)	6 (7.7%)	5 (6.0%)	10 (12.8%)	5 (6.0%)	8 (12.9%)	2 (3.3%)	4 (5.8%)	6 (8.5%)	9 (11.1%)	5 (5.6%)	8 (9.0%)	103 (7.5%)
Known HCV positive	0 (0.0%)	2 (2.1%)	4 (2.8%)	2 (1.6%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	2 (2.6%)	3 (3.6%)	0 (0.0%)	0 (0.0%)	1 (1.4%)	4 (5.6%)	1 (1.2%)	1 (1.1%)	1 (1.1%)	22 (1.6%)
Known HIV positive	0 (0.0%)	3 (3.2%)	9 (6.3%)	0 (0.0%)	5 (3.7%)	1 (1.3%)	2 (2.4%)	4 (5.1%)	2 (2.4%)	3 (4.8%)	2 (3.3%)	1 (1.4%)	6 (8.5%)	0 (0.0%)	4 (4.4%)	3 (3.4%)	45 (3.3%)
B. All other exposure cases																	
Source identified																	
Known HBsAg positive	1 (2.6%)	6 (6.3%)	7 (4.7%)	7 (5.0%)	6 (4.6%)	5 (3.8%)	5 (3.8%)	14 (7.3%)	6 (3.1%)	3 (1.6%)	7 (2.9%)	10 (4.9%)	9 (4.0%)	13 (5.5%)	14 (5.3%)	7 (2.6%)	120 (4.2%)
Known HCV positive	0 (0.0%)	1 (1.0%)	1 (0.7%)	0 (0.0%)	1 (0.8%)	2 (1.5%)	3 (2.3%)	2 (1.0%)	1 (0.5%)	0 (0.0%)	1 (0.4%)	1 (0.5%)	0 (0.0%)	2 (0.8%)	3 (1.1%)	3 (1.1%)	21 (0.7%)
Known HIV positive	1 (2.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.5%)	1 (0.8%)	5 (3.8%)	5 (2.6%)	9 (4.7%)	3 (1.6%)	7 (2.9%)	4 (2.0%)	8 (3.6%)	7 (2.9%)	15 (5.7%)	10 (3.6%)	77 (2.7%)

Table 9. Activity or procedure involved, contact specimen and the implicated device in health care workers with occupational exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Activity or procedure																	
Blood-taking or IV catheter insertion	4 (13.3%)	15 (12.3%)	27 (16.1%)	23 (14.9%)	29 (18.5%)	10 (10.3%)	3 (3.3%)	4 (4.5%)	5 (5.0%)	8 (9.3%)	3 (4.0%)	4 (5.0%)	8 (10.3%)	10 (10.4%)	5 (4.9%)	9 (9.2%)	167 (10.3%)
Injection including recap	6 (20.0%)	20 (16.4%)	29 (17.3%)	26 (16.9%)	18 (11.5%)	13 (13.4%)	10 (10.9%)	13 (14.8%)	3 (3.0%)	11 (12.8%)	10 (13.3%)	13 (16.3%)	13 (16.7%)	16 (16.7%)	17 (16.7%)	13 (13.3%)	231 (14.2%)
Other bedside/treatment room procedures	9 (30.0%)	34 (27.9%)	47 (28.0%)	28 (18.2%)	29 (18.5%)	15 (15.5%)	17 (18.5%)	5 (5.7%)	17 (17.0%)	8 (9.3%)	7 (9.3%)	7 (8.8%)	5 (6.4%)	14 (14.6%)	10 (9.8%)	15 (15.3%)	267 (16.5%)
Cleansing or tidying up after procedures	4 (13.3%)	16 (13.1%)	20 (11.9%)	30 (19.5%)	22 (14.0%)	21 (21.6%)	23 (25.0%)	17 (19.3%)	28 (28.0%)	26 (30.2%)	25 (33.3%)	17 (21.3%)	13 (16.7%)	20 (20.8%)	16 (15.7%)	17 (17.3%)	315 (19.4%)
Others	7 (23.3%)	37 (30.3%)	45 (26.8%)	47 (30.5%)	57 (36.3%)	34 (35.1%)	38 (41.3%)	41 (46.6%)	39 (39.0%)	25 (29.1%)	20 (26.7%)	35 (43.8%)	39 (50.0%)	31 (32.3%)	39 (38.2%)	33 (33.7%)	567 (34.9%)
Contact specimen																	
Blood or blood products	12 (40.0%)	33 (27.0%)	51 (30.4%)	53 (34.4%)	54 (34.4%)	44 (45.4%)	27 (29.3%)	25 (28.4%)	27 (27.0%)	23 (26.7%)	20 (26.7%)	18 (22.5%)	27 (34.6%)	28 (29.2%)	25 (24.5%)	25 (25.5%)	492 (30.3%)
Blood-contaminated fluid	9 (30.0%)	38 (31.1%)	32 (19.0%)	5 (3.2%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.1%)	1 (1.0%)	1 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	0 (0.0%)	89 (5.5%)
Saliva or urine	6 (20.0%)	29 (23.8%)	56 (33.3%)	25 (16.2%)	9 (5.7%)	7 (7.2%)	7 (7.6%)	11 (12.5%)	13 (13.0%)	11 (12.8%)	9 (12.0%)	12 (15.0%)	6 (7.7%)	7 (7.3%)	7 (6.9%)	5 (5.1%)	220 (13.6%)
Others or unknown	3 (10.0%)	22 (18.0%)	29 (17.3%)	71 (46.1%)	94 (59.9%)	45 (46.4%)	58 (63.0%)	51 (58.0%)	59 (59.0%)	51 (59.3%)	46 (61.3%)	50 (62.5%)	45 (57.7%)	60 (62.5%)	70 (68.6%)	68 (69.4%)	822 (50.6%)
Technical device																	
Hollow-bore needle	13 (43.3%)	53 (43.4%)	81 (48.2%)	82 (53.2%)	83 (52.9%)	47 (48.5%)	42 (45.7%)	41 (46.6%)	37 (37.0%)	41 (47.7%)	36 (48.0%)	40 (50.0%)	41 (52.6%)	45 (46.9%)	51 (50.0%)	40 (40.8%)	773 (47.6%)
Lancet	7 (23.3%)	13 (10.7%)	24 (14.3%)	21 (13.6%)	20 (12.7%)	10 (10.3%)	4 (4.3%)	2 (2.3%)	3 (3.0%)	3 (26.7%)	2 (8.0%)	2 (10.0%)	1 (0.0%)	2 (0.0%)	4 (0.0%)	2 (0.0%)	120 (7.4%)
Dental instrument	5 (16.7%)	12 (9.8%)	22 (13.1%)	16 (10.4%)	16 (10.2%)	19 (19.6%)	32 (34.8%)	21 (46.6%)	37 (3.0%)	23 (26.7%)	27 (8.0%)	20 (10.0%)	13 (0.0%)	30 (0.0%)	22 (0.0%)	28 (0.0%)	343 (21.1%)
Others	2 (6.7%)	20 (16.4%)	20 (11.9%)	23 (14.9%)	23 (14.6%)	17 (17.5%)	8 (8.7%)	12 (13.6%)	9 (9.0%)	13 (15.1%)	6 (8.0%)	10 (12.5%)	10 (12.8%)	9 (9.4%)	13 (12.7%)	15 (15.3%)	210 (12.9%)
Nil	3 (10.0%)	24 (19.7%)	21 (12.5%)	12 (7.8%)	15 (9.6%)	4 (4.1%)	6 (6.5%)	12 (13.6%)	14 (14.0%)	6 (7.0%)	4 (5.3%)	8 (10.0%)	13 (16.7%)	10 (10.4%)	12 (11.8%)	13 (13.3%)	177 (10.9%)

Table 10. Activity or procedure involved in medical and dental professionals with occupational exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Activity or procedure																	
Blood-taking or IV catheter insertion	0 (0.0%)	3 (9.7%)	8 (15.1%)	5 (13.2%)	8 (20.0%)	0 (0.0%)	0 (0.0%)	1 (2.1%)	1 (1.7%)	2 (4.1%)	1 (2.4%)	1 (2.6%)	0 (0.0%)	2 (3.8%)	1 (2.1%)	4 (7.5%)	37 (5.4%)
Injection including recap	2 (28.6%)	8 (25.8%)	10 (18.9%)	8 (21.1%)	7 (17.5%)	10 (23.3%)	4 (8.3%)	7 (14.6%)	2 (3.4%)	6 (12.2%)	4 (9.5%)	8 (20.5%)	9 (25.7%)	5 (9.4%)	7 (14.6%)	6 (11.3%)	103 (15.0%)
Other bedside/treatment room procedures	2 (28.6%)	12 (38.7%)	23 (43.4%)	10 (26.3%)	9 (22.5%)	10 (23.3%)	11 (22.9%)	3 (6.3%)	14 (23.7%)	4 (8.2%)	6 (14.3%)	5 (12.8%)	4 (11.4%)	10 (18.9%)	6 (12.5%)	11 (20.8%)	140 (20.4%)
Cleansing or tidying up after procedures	3 (42.9%)	7 (22.6%)	9 (17.0%)	12 (31.6%)	7 (17.5%)	12 (27.9%)	17 (35.4%)	11 (22.9%)	24 (40.7%)	20 (40.8%)	18 (42.9%)	10 (25.6%)	10 (28.6%)	18 (34.0%)	13 (27.1%)	15 (28.3%)	206 (30.0%)
Surgery in operating theatre	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (7.5%)	3 (7.0%)	7 (14.6%)	7 (14.6%)	6 (10.2%)	3 (6.1%)	0 (0.0%)	0 (0.0%)	2 (5.7%)	1 (1.9%)	2 (4.2%)	0 (0.0%)	34 (5.0%)
Sharps disposal	0 (0.0%)	1 (3.2%)	2 (3.8%)	2 (5.3%)	3 (7.5%)	7 (16.3%)	6 (12.5%)	11 (22.9%)	7 (11.9%)	9 (18.4%)	8 (19.0%)	5 (12.8%)	6 (17.1%)	6 (11.3%)	9 (18.8%)	7 (13.2%)	89 (13.0%)
Other	0 (0.0%)	0 (0.0%)	1 (1.9%)	1 (2.6%)	3 (7.5%)	1 (2.3%)	2 (4.2%)	7 (14.6%)	5 (8.5%)	3 (6.1%)	4 (9.5%)	10 (25.6%)	4 (11.4%)	9 (17.0%)	5 (10.4%)	5 (9.4%)	60 (8.7%)

Table 11. Activity or procedure involved in nursing professionals with occupational exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Activity or procedure																	
Blood-taking/IV catheter insertion	4 (19.0%)	10 (19.6%)	17 (23.3%)	15 (23.4%)	14 (21.5%)	6 (23.1%)	1 (3.1%)	2 (10.0%)	2 (11.1%)	3 (20.0%)	2 (15.4%)	3 (14.3%)	8 (33.3%)	7 (22.6%)	3 (8.3%)	4 (16.0%)	101 (18.9%)
Injection including recap	4 (19.0%)	12 (23.5%)	18 (24.7%)	17 (26.6%)	11 (16.9%)	3 (11.5%)	4 (12.5%)	5 (25.0%)	0 (0.0%)	5 (33.3%)	4 (30.8%)	5 (23.8%)	4 (16.7%)	10 (32.3%)	9 (25.0%)	6 (24.0%)	117 (21.9%)
Other bedside/treatment room procedures	7 (33.3%)	16 (31.4%)	22 (30.1%)	13 (20.3%)	11 (16.9%)	2 (7.7%)	5 (15.6%)	2 (10.0%)	3 (16.7%)	3 (20.0%)	1 (7.7%)	1 (4.8%)	1 (4.2%)	3 (9.7%)	4 (11.1%)	3 (12.0%)	97 (18.1%)
Cleansing/tidying up after procedures	1 (4.8%)	3 (5.9%)	2 (2.7%)	3 (4.7%)	5 (7.7%)	2 (7.7%)	6 (18.8%)	1 (5.0%)	1 (5.6%)	1 (6.7%)	2 (15.4%)	0 (0.0%)	0 (0.0%)	1 (3.2%)	2 (5.6%)	2 (8.0%)	32 (6.0%)
Surgery in operating theatre	0 (0.0%)	2 (3.9%)	5 (6.8%)	5 (7.8%)	3 (4.6%)	6 (23.1%)	2 (6.3%)	3 (15.0%)	2 (11.1%)	1 (6.7%)	0 (0.0%)	1 (4.8%)	2 (8.3%)	1 (3.2%)	2 (5.6%)	0 (0.0%)	35 (6.5%)
Sharps disposal	3 (14.3%)	1 (2.0%)	4 (5.5%)	4 (6.3%)	11 (16.9%)	4 (15.4%)	9 (28.1%)	6 (30.0%)	9 (50.0%)	2 (13.3%)	3 (23.1%)	10 (47.6%)	4 (16.7%)	5 (16.1%)	7 (19.4%)	3 (12.0%)	85 (15.9%)
Other	2 (9.5%)	7 (13.7%)	5 (6.8%)	7 (10.9%)	9 (13.8%)	2 (7.7%)	5 (15.6%)	1 (5.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.8%)	5 (20.8%)	2 (6.5%)	5 (13.9%)	6 (24.0%)	57 (10.7%)

Table 12. Exposures with risk factors that may or may not be related to HIV transmission in health care workers with occupational exposure (n=1092)

	*Higher risk	**Lower risk
1999 (Jul-Dec)	15 (50.0%)	7 (23.3%)
2000	54 (44.3%)	25 (20.5%)
2001	74 (44.0%)	50 (29.8%)
2002	98 (63.6%)	4 (2.6%)
2003	100 (63.7%)	7 (4.5%)
2004	62 (63.9%)	3 (3.1%)
2005	56 (60.9%)	5 (5.4%)
2006	56 (63.6%)	7 (8.0%)
2007	51 (51.0%)	17 (17.0%)
2008	50 (58.1%)	6 (7.0%)
2009	49 (65.3%)	4 (5.3%)
2010	46 (57.5%)	7 (8.8%)
2011	49 (62.8%)	14 (17.9%)
2012	56 (58.3%)	4 (4.2%)
2013	53 (52.0%)	6 (5.9%)
2014	42 (42.9%)	15 (15.3%)
Total	911 (56.1%)	181 (11.2%)

*risk factors of: deep percutaneous injury, involving procedures with device placed in a blood vessel, involving a hollow-bore needle, device which is visibly contaminated with blood, source person with AIDS

**risk factors of: moderate percutaneous injury, mucosal contact, contact with deep body fluids other than blood, source person is HIV infected but not or not sure to be at the stage of AIDS, other reasons contributing to increased risk

Table 13. Frequency of risk factors in health care workers with presence of risk factors from occupational exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Higher risk																	
1 risk factor	13 (43.3%)	47 (38.5%)	62 (36.9%)	92 (59.7%)	99 (63.1%)	59 (60.8%)	55 (59.8%)	54 (61.4%)	48 (48.0%)	45 (52.3%)	48 (64.0%)	42 (52.5%)	49 (62.8%)	56 (58.3%)	52 (51.0%)	37 (37.8%)	858 (52.9%)
2 risk factors	1 (3.3%)	3 (2.5%)	3 (1.8%)	6 (3.9%)	1 (0.6%)	2 (2.1%)	1 (1.1%)	0 (0.0%)	1 (1.0%)	4 (4.7%)	0 (0.0%)	4 (5.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	4 (4.1%)	31 (1.9%)
>=3 risk factors	1 (3.3%)	4 (3.3%)	9 (5.4%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	2 (2.3%)	2 (2.0%)	1 (1.2%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	22 (1.4%)
Lower risk																	
1 risk factor	7 (23.3%)	24 (19.7%)	50 (29.8%)	4 (2.6%)	7 (4.5%)	3 (3.1%)	4 (4.3%)	7 (8.0%)	17 (17.0%)	6 (7.0%)	4 (5.3%)	6 (7.5%)	14 (17.9%)	4 (4.2%)	6 (5.9%)	15 (15.3%)	178 (11.0%)
2 risk factors	0 (0.0%)	1 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (0.2%)
>=3 risk factors	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 14. Presence of risk factors in higher risk occupational exposure sustained by health care workers during various activities or procedures

	No. of workers	No. of risk factors		
		Range	Mean	(95% CI)
Blood-taking or IV catheter insertion	147	1-4	1.29	1.18-1.4
Injection including recap	206	1-2	1.02	1.003-1.045
Other bedside/treatment room procedures	101	1-2	1.03	0.996-1.063
Cleansing or tidying up after procedures	115	1-3	1.03	0.988-1.064
Surgery in operating theatre	46	1-1	1.00	--
Sharps disposal	183	1-3	1.09	1.038-1.147
Others	96	1-2	1.04	1.001-1.082

Table 15. Precautions (can be more than one) taken during the exposure among health care workers with occupational exposure

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Glove	8 (26.7%)	47 (38.5%)	79 (47.0%)	75 (48.7%)	97 (61.8%)	74 (76.3%)	65 (70.7%)	64 (72.7%)	83 (83.0%)	70 (81.4%)	56 (74.7%)	46 (57.5%)	54 (69.2%)	67 (69.8%)	71 (69.6%)	65 (66.3%)	1021 (62.9%)
Goggle/glasses*/mask	2 (6.7%)	2 (1.6%)	5 (3.0%)	5 (3.2%)	0 (0.0%)	2 (2.1%)	2 (2.2%)	0 (0.0%)	12 (12.0%)	4 (4.7%)	0 (0.0%)	5 (6.3%)	9 (11.5%)	0 (0.0%)	2 (2.0%)	4 (4.1%)	54 (3.3%)
Gown/apron	3 (10.0%)	1 (0.8%)	5 (3.0%)	4 (2.6%)	2 (1.3%)	5 (5.2%)	6 (6.5%)	2 (2.3%)	7 (7.0%)	3 (3.5%)	3 (4.0%)	10 (12.5%)	1 (1.3%)	1 (1.0%)	2 (2.0%)	1 (1.0%)	56 (3.5%)
Nil	2 (6.7%)	28 (23.0%)	20 (11.9%)	12 (7.8%)	8 (5.1%)	3 (3.1%)	2 (2.2%)	1 (1.1%)	1 (1.0%)	3 (3.5%)	0 (0.0%)	4 (5.0%)	6 (7.7%)	7 (7.3%)	4 (3.9%)	4 (4.1%)	105 (6.5%)

*glasses are not regarded as legitimate personal protective equipment

Table 16. Time lag in hours between exposure and first medical consult

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
<2	15 (50.0%)	66 (54.1%)	91 (54.2%)	77 (50.0%)	100 (63.7%)	54 (55.7%)	48 (52.2%)	43 (48.9%)	40 (40.0%)	38 (44.2%)	34 (45.3%)	31 (38.8%)	28 (35.9%)	32 (33.3%)	23 (22.5%)	27 (27.6%)	747 (46.0%)
2-12	7 (23.3%)	25 (20.5%)	48 (28.6%)	57 (37.0%)	46 (29.3%)	30 (30.9%)	28 (30.4%)	31 (35.2%)	44 (44.0%)	36 (41.9%)	32 (42.7%)	34 (42.5%)	31 (39.7%)	47 (49.0%)	56 (54.9%)	46 (46.9%)	598 (36.8%)
12-24	1 (3.3%)	7 (5.7%)	9 (5.4%)	5 (3.2%)	5 (3.2%)	5 (5.2%)	5 (5.4%)	8 (9.1%)	10 (10.0%)	4 (4.7%)	3 (4.0%)	7 (8.8%)	10 (12.8%)	5 (5.2%)	10 (9.8%)	5 (5.1%)	99 (6.1%)
24-48	4 (13.3%)	6 (4.9%)	6 (3.6%)	8 (5.2%)	2 (1.3%)	2 (2.1%)	4 (4.3%)	1 (1.1%)	2 (2.0%)	6 (7.0%)	3 (4.0%)	4 (5.0%)	4 (5.1%)	3 (3.1%)	6 (5.9%)	6 (6.1%)	67 (4.1%)
48-72	3 (10.0%)	5 (4.1%)	4 (2.4%)	1 (0.6%)	0 (0.0%)	2 (2.1%)	0 (0.0%)	2 (2.3%)	0 (0.0%)	1 (1.2%)	0 (0.0%)	2 (2.5%)	1 (1.3%)	2 (2.1%)	2 (2.0%)	1 (1.0%)	26 (1.6%)
>72	0 (0.0%)	13 (10.7%)	10 (6.0%)	6 (3.9%)	4 (2.5%)	4 (4.1%)	7 (7.6%)	3 (3.4%)	4 (4.0%)	1 (1.2%)	3 (4.0%)	2 (2.5%)	4 (5.1%)	6 (6.3%)	5 (4.9%)	11 (11.2%)	83 (5.1%)
Median (inter-quartile range)	1.86 (0.75-21.56)	1.705 (0.71-13.44)	1.42 (0.5-5.33)	1.975 (1-3.19)	1 (0.48-2.93)	1.3 (0.7-4)	1.7 (0.3-6.52)	2 (1-4.86)	2.58 (1-5.11)	2.23 (1-4.89)	2 (0.8-4.95)	2.5 (1.16-6)	3.1 (1.3-10.05)	2.7 (1.3-5.3)	4.08 (2-10)	3.85 (1.7-10.8)	2 (0.85-5.3)
B. All other exposure cases																	
<2	55 (55.6%)	127 (47.7%)	163 (42.9%)	116 (39.3%)	102 (44.2%)	92 (41.4%)	86 (36.1%)	99 (31.0%)	65 (24.0%)	69 (26.1%)	71 (21.5%)	64 (22.1%)	74 (23.6%)	63 (17.6%)	61 (17.5%)	66 (17.8%)	1373 (29.9%)
2-12	21 (21.2%)	57 (21.4%)	96 (25.3%)	118 (40.0%)	81 (35.1%)	93 (41.9%)	104 (43.7%)	162 (50.8%)	155 (57.2%)	143 (54.2%)	182 (55.2%)	172 (59.3%)	184 (58.6%)	207 (57.8%)	207 (59.5%)	221 (59.6%)	2203 (47.9%)
12-24	8 (8.1%)	24 (9.0%)	37 (9.7%)	21 (7.1%)	15 (6.5%)	16 (7.2%)	21 (8.8%)	22 (6.9%)	12 (4.4%)	19 (7.2%)	32 (9.7%)	17 (5.9%)	17 (5.4%)	28 (7.8%)	21 (6.0%)	34 (9.2%)	344 (7.5%)
24-48	8 (8.1%)	19 (7.1%)	34 (8.9%)	15 (5.1%)	12 (5.2%)	13 (5.9%)	14 (5.9%)	9 (2.8%)	19 (7.0%)	14 (5.3%)	16 (4.8%)	19 (6.6%)	18 (5.7%)	29 (8.1%)	21 (6.0%)	28 (7.5%)	288 (6.3%)
48-72	2 (2.0%)	9 (3.4%)	15 (3.9%)	5 (1.7%)	8 (3.5%)	1 (0.5%)	5 (2.1%)	7 (2.2%)	9 (3.3%)	7 (2.7%)	7 (2.1%)	4 (1.4%)	10 (3.2%)	6 (1.7%)	14 (4.0%)	5 (1.3%)	114 (2.5%)
>72	5 (5.1%)	30 (11.3%)	35 (9.2%)	20 (6.8%)	13 (5.6%)	7 (3.2%)	8 (3.4%)	20 (2.8%)	11 (3.3%)	12 (4.5%)	22 (6.7%)	14 (4.8%)	11 (3.5%)	22 (6.1%)	24 (6.9%)	16 (4.3%)	270 (5.9%)
Median (inter-quartile range)	1.21 (0.6-10.4)	2 (0.73-19.96)	2.39 (1-21.46)	2.7 (1.3-7.85)	2.27 (1-7)	2.275 (1.01-6)	2.7 (1.3-6.19)	2.7 (1.3-6.06)	3.7 (2-7)	3.7 (1.81-7.66)	3.75 (2-9.12)	3.55 (2-7.08)	3 (2-7)	4 (2.15-11.45)	4 (2-10)	4 (2-10)	3 (1.7-8.85)

Table 17. Baseline epidemiology of hepatitis B, hepatitis C and HIV in the exposed persons

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
HBsAg+ve	2 (8.0%)	5 (6.3%)	2 (1.9%)	10 (9.9%)	6 (6.0%)	5 (7.8%)	3 (5.7%)	5 (9.3%)	3 (5.1%)	3 (5.9%)	1 (2.0%)	0 (0.0%)	1 (2.0%)	2 (3.0%)	1 (1.3%)	3 (4.1%)	52 (4.9%)
Anti-HBs+ve	10 (45.5%)	59 (77.6%)	83 (76.1%)	72 (71.3%)	71 (71.0%)	41 (65.1%)	34 (63.0%)	37 (67.3%)	50 (83.3%)	44 (74.6%)	38 (71.7%)	36 (72.0%)	35 (64.8%)	60 (80.0%)	62 (77.5%)	58 (75.3%)	790 (72.6%)
Anti-HCV+ve	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Anti-HIV+ve	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
B. All other exposure cases																	
HBsAg+ve	13 (14.0%)	22 (9.4%)	24 (7.3%)	23 (8.6%)	25 (11.8%)	15 (7.7%)	14 (6.7%)	17 (5.8%)	24 (9.9%)	21 (8.6%)	24 (7.8%)	17 (6.5%)	18 (6.2%)	21 (6.4%)	18 (5.5%)	18 (5.2%)	314 (7.5%)
Anti-HBs+ve	43 (53.8%)	95 (44.8%)	149 (47.6%)	143 (55.9%)	84 (44.4%)	107 (56.6%)	102 (51.0%)	159 (55.6%)	107 (45.5%)	117 (50.6%)	148 (51.0%)	146 (58.2%)	169 (59.9%)	188 (59.3%)	163 (50.9%)	188 (56.8%)	2108 (52.9%)
Anti-HCV+ve	0 (0.0%)	1 (6.3%)	1 (2.0%)	1 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)	0 (0.0%)	7 (0.4%)
Anti-HIV+ve	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)

Table 17b. Baseline epidemiology of hepatitis B, hepatitis C and HIV of exposed cleansing workers

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Exposed Cleansing workers																	
HBsAg+ve	5 (19.2%)	6 (10.0%)	5 (7.1%)	8 (11.6%)	7 (12.3%)	5 (11.4%)	3 (7.0%)	4 (6.3%)	5 (12.5%)	5 (13.2%)	6 (13.0%)	3 (7.9%)	4 (10.3%)	8 (14.0%)	3 (9.4%)	1 (2.9%)	78 (10.3%)
Anti-HBs+ve	12 (60.0%)	28 (48.3%)	38 (57.6%)	37 (57.8%)	20 (37.0%)	20 (50.0%)	25 (61.0%)	40 (62.5%)	18 (46.2%)	17 (51.5%)	27 (64.3%)	18 (50.0%)	23 (65.7%)	35 (64.8%)	23 (74.2%)	19 (54.3%)	400 (56.2%)
Anti-HCV+ve	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Anti-HIV+ve	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

*Number of cases tested for each blood-borne pathogens varied

Table 18. Number and proportion of all exposed persons with prescription of HIV post-exposure prophylaxis at Accident & Emergency Department or Therapeutic Prevention Clinic

	Health care work workers with occupational exposure	All other exposure cases	Total
1999 (Jul-Dec)	3 (10.0%)	1 (1.0%)	4 (3.1%)
2000	2 (1.6%)	4 (1.5%)	6 (1.5%)
2001	6 (3.6%)	4 (1.1%)	10 (1.8%)
2002	4 (2.6%)	4 (1.4%)	8 (1.8%)
2003	8 (5.1%)	4 (1.7%)	12 (3.1%)
2004	1 (1.0%)	5 (2.3%)	6 (1.9%)
2005**	1 (1.1%)	2 (0.8%)	3 (0.9%)
2006	3 (3.4%)	7 (2.2%)	10 (2.5%)
2007	2 (2.0%)	10 (3.7%)	12 (3.2%)
2008	6 (7.0%)	13 (4.9%)	19 (5.4%)
2009	0 (0.0%)	13 (3.9%)	13 (3.2%)
2010	4 (5.0%)	7 (2.4%)	11 (3.0%)
2011	1 (1.3%)	16 (5.1%)	17 (4.3%)
2012	4 (4.2%)	11 (3.1%)	15 (3.3%)
2013	3 (2.9%)	31 (8.9%)	34 (7.6%)
2014	2 (2.0%)	31 (8.4%)	33 (7.0%)
Total	50 (3.1%)	163 (3.5%)	213 (3.4%)

Table 19. Time lag between exposure and start of HIV PEP

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure (n=50)																	
Mean (hours)	3.2	5.0	4.3	8.7	6.2	4.0	22.7	4.6	7.3	25.6	0.0	3.1	32.0	9.1	2.8	36.0	10.0
Median (hours)	3.9	5.0	2.4	4.5	3.7	4.0	22.7	4.0	7.3	21.1	0.0	2.2	32.0	6.6	2.0	36.0	4.1
No.<=2 hours	1	1	3	1	3	0	0	0	0	2	0	2	0	1	2	0	16
No.<=24 hours	3	2	6	3	8	1	1	3	2	3	0	4	0	4	3	0	43
B. All other exposure cases (n=163)																	
Mean (hours)	37.7	14.2	14.4	14.6	14.8	15.6	9.0	36.1	23.6	31.9	32.3	9.7	25.4	18.5	29.3	22.6	24.4
Median (hours)	37.7	13.4	15.8	15.1	15.2	16.7	9.0	19.3	18.7	30.7	28.0	7.8	24.0	13.0	22.5	17.0	18.1
No.<=2 hours	0	1	0	0	0	1	0	0	1	1	1	2	0	0	1	0	8
No.<=24 hours	0	3	4	4	4	4	2	4	6	5	5	6	8	9	16	21	101

Table 20. Clients initiated with PEP that was continued at TPC

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure	1	1	5	3	6	1	0	3	1	6	0	1	1	4	3	2	38
	(33.3%)	(50.0%)	(83.3%)	(75.0%)	(75.0%)	(100%)	(0.0%)	(100%)	(50.0%)	(100%)	-	(25.0%)	(100%)	(100%)	(100%)	(100%)	(76.0%)
B. All other exposure cases	0	0	0	2	3	2	0	4	5	8	9	5	12	10	24	26	110
	(0.0%)	(0.0%)	(0.0%)	(50.0%)	(75.0%)	(40.0%)	(0.0%)	(57.1%)	(50.0%)	(61.5%)	(69.2%)	(71.4%)	(75.0%)	(90.9%)	(77.4%)	(83.9%)	(67.5%)

Table 21. Outcome of exposed persons who were continued on PEP at TPC with regard to PEP intake and HIV status of source

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Known PEP intake outcome	1	1	4	3	6	1	0	3	1	6	0	1	1	4	3	2	37
	(100.0%)	(100.0%)	(80.0%)	(100.0%)	(100.0%)	(100.0%)	-	(100.0%)	(100.0%)	(100.0%)	-	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(97.4%)
Source confirmed HIV positive	0	0	1	0	3	0	0	2	1	3	0	1	0	0	3	1	15
	(0.0%)	(0.0%)	(20.0%)	(0.0%)	(50.0%)	(0.0%)	-	(66.7%)	(100.0%)	(50.0%)	-	(100.0%)	(0.0%)	(0.0%)	(100.0%)	(50.0%)	(39.5%)
B. All other exposure cases																	
Known PEP intake outcome	0	0	0	2	2	2	0	4	5	8	9	5	12	10	22	22	103
	-	-	-	(100.0%)	(66.7%)	(100.0%)	-	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(91.7%)	(84.6%)	(93.6%)
Source confirmed HIV positive	0	0	0	0	1	1	0	2	3	5	1	3	5	4	10	8	43
	-	-	-	(0.0%)	(33.3%)	(50.0%)	-	(50.0%)	(60.0%)	(62.5%)	(11.1%)	(60.0%)	(41.7%)	(40.0%)	(41.7%)	(30.8%)	(39.1%)

Table 22. PEP regimens prescribed to exposed persons with known PEP intake outcome

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
2 drugs	1	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	5
	(100.0%)	(100.0%)	(0.0%)	(33.3%)	(0.0%)	(0.0%)	-	(33.3%)	(0.0%)	(0.0%)	-	(0.0%)	(0.0%)	(25.0%)	(0.0%)	(0.0%)	(13.5%)
3 drugs	0	0	4	2	6	1	0	2	1	6	0	1	1	3	3	2	32
	(0.0%)	(0.0%)	(100.0%)	(66.7%)	(100.0%)	(100.0%)	-	(66.7%)	(100.0%)	(100.0%)	-	(100.0%)	(100.0%)	(75.0%)	(100.0%)	(100.0%)	(86.5%)
B. All other exposure cases																	
2 drugs	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	5
	-	-	-	(0.0%)	(0.0%)	(0.0%)	-	(0.0%)	(0.0%)	(0.0%)	(11.1%)	(0.0%)	(0.0%)	(10.0%)	(13.6%)	(0.0%)	(4.9%)
3 drugs	0	0	0	2	2	2	0	4	5	8	8	5	12	9	19	22	98
	-	-	-	(100.0%)	(100.0%)	(100.0%)	-	(100.0%)	(100.0%)	(100.0%)	(88.9%)	(100.0%)	(100.0%)	(90.0%)	(86.4%)	(100.0%)	(95.1%)

Table 23. Experience of toxicity in exposed persons with known PEP intake outcome

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Had toxicity																	
2 drugs	1	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	5
	(100.0%)	(100.0%)	-	(100.0%)	-	-	-	(100.0%)	-	-	-	-	-	(100.0%)	-	-	(100.0%)
3 drugs	0	0	4	2	6	1	0	1	1	5	0	1	1	2	2	1	27
	-	-	(100.0%)	(100.0%)	(100.0%)	(100.0%)	-	(50.0%)	(100.0%)	(83.3%)	-	(100.0%)	(100.0%)	(66.7%)	(66.7%)	(50.0%)	(84.4%)
2 or 3 drugs	1	1	4	3	6	1	0	2	1	5	0	1	1	3	2	1	32
	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	-	(66.7%)	(100.0%)	(83.3%)	-	(100.0%)	(100.0%)	(75.0%)	(66.7%)	(50.0%)	(86.5%)
Moderate to severe toxicity	1	0	1	3	4	0	0	1	1	1	0	1	1	2	2	0	18
	(100.0%)	(0.0%)	(25.0%)	(100.0%)	(66.7%)	(0.0%)	-	(33.3%)	(100.0%)	(16.7%)	-	(100.0%)	(100.0%)	(50.0%)	(66.7%)	(0.0%)	(48.6%)
B. All other exposure cases																	
Had toxicity																	
2 drugs	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	4
	-	-	-	-	-	-	-	-	-	-	(100.0%)	-	-	(100.0%)	(66.7%)	-	(80.0%)
3 drugs	0	0	0	1	1	2	0	4	3	7	4	5	8	8	15	13	71
	-	-	-	(50.0%)	(50.0%)	(100.0%)	-	(100.0%)	(60.0%)	(87.5%)	(50.0%)	(100.0%)	(66.7%)	(88.9%)	(78.9%)	(59.1%)	(72.4%)
2 or 3 drugs	0	0	0	1	1	2	0	4	3	7	5	5	8	9	17	13	75
	-	-	-	(50.0%)	(50.0%)	(100.0%)	-	(100.0%)	(60.0%)	(87.5%)	(55.6%)	(100.0%)	(66.7%)	(90.0%)	(77.3%)	(59.1%)	(72.8%)
Moderate to severe toxicity	0	0	0	1	0	1	0	1	2	1	1	3	4	1	6	2	23
	-	-	-	(50.0%)	(0.0%)	(50.0%)	-	(25.0%)	(40.0%)	(12.5%)	(11.1%)	(60.0%)	(33.3%)	(10.0%)	(27.3%)	(9.1%)	(22.3%)

Table 24. Completion of PEP in exposed persons with known PEP intake outcome

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
2 drugs	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
	(100.0%)	-	-	(0.0%)	-	-	-	(100.0%)	-	-	-	-	-	(0.0%)	-	-	(40.0%)
3 drugs	0	0	2	0	2	1	0	1	1	3	0	1	1	2	3	2	19
	-	-	(50.0%)	(0.0%)	(33.3%)	(100.0%)	-	(50.0%)	(100.0%)	(50.0%)	-	(100.0%)	(100.0%)	(66.7%)	(100.0%)	(100.0%)	(59.4%)
2 or 3 drugs	1	0	2	0	2	1	0	2	1	3	0	1	1	2	3	2	21
	(100.0%)	(0.0%)	(50.0%)	(0.0%)	(33.3%)	(100.0%)	-	(66.7%)	(100.0%)	(50.0%)	-	(100.0%)	(100.0%)	(50.0%)	(100.0%)	(100.0%)	(56.8%)
B. All other exposure cases																	
2 drugs	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	5
	-	-	-	-	-	-	-	-	-	-	(100.0%)	-	-	(100.0%)	(100.0%)	-	(100.0%)
3 drugs	0	0	0	1	1	2	0	2	4	7	5	2	9	6	18	21	78
	-	-	-	(50.0%)	(50.0%)	(100.0%)	-	(50.0%)	(80.0%)	(87.5%)	(62.5%)	(40.0%)	(75.0%)	(66.7%)	(94.7%)	(95.5%)	(79.6%)
2 or 3 drugs	0	0	0	1	1	2	0	2	4	7	6	2	9	7	21	21	83
	-	-	-	(50.0%)	(50.0%)	(100.0%)	-	(50.0%)	(80.0%)	(87.5%)	(66.7%)	(40.0%)	(75.0%)	(70.0%)	(95.5%)	(95.5%)	(80.6%)

Table 25. Duration of PEP in exposed persons with known PEP intake outcome

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
2 drugs	28.00	7.00	0.00	5.00	0.00	0.00	-	28.00	-	-	-	-	-	5.00	-	-	14.60
3 drugs	0.00	0.00	19.75	14.00	12.50	28.00	-	14.50	28.00	18.17	-	28.00	28.00	20.67	28.00	28.00	19.81
2 or 3 drugs	28.00	7.00	19.75	11.00	12.50	28.00	-	19.00	28.00	17.17	-	28.00	28.00	16.75	28.00	28.00	19.11
B. All other exposure cases																	
2 drugs	-	-	-	-	-	-	-	-	-	-	28	-	-	28	28	-	28
3 drugs	-	-	-	15.5	21	28	-	21	27.4	26.38	24.13	20.8	23	23	28.17	27	25.18
2 or 3 drugs	-	-	-	15.5	21	28	-	21	27.4	26.38	24.56	20.8	23	23.5	28.14	27	25.31

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median
2 drugs	28.00	7.00	0.00	5.00	0.00	0.00	-	28.00	-	-	-	-	-	5.00	-	-	7.00
3 drugs	0.00	0.00	20.50	14.00	6.50	28.00	-	14.50	28.00	20.50	-	28.00	28.00	28.00	28.00	28.00	28.00
2 or 3 drugs	28.00	7.00	20.50	7.00	6.50	28.00	-	28.00	28.00	20.50	-	28.00	28.00	17.00	28.00	28.00	28.00
B. All other exposure cases																	
2 drugs	-	-	-	-	-	-	-	-	-	-	28.00	-	-	28.00	28.00	-	28.00
3 drugs	-	-	-	15.50	21.00	28.00	-	23.00	28.00	28.00	28.00	23.00	28.00	28.00	28.00	28.00	28.00
2 or 3 drugs				15.50	21.00	28.00	-	23.00	28.00	28.00	28.00	23.00	28.00	28.00	28.00	28.00	28.00

Table 26. Reasons (can be >1) for not completing PEP in exposed persons with known PEP intake outcome who were prescribed 2 or 3 drugs

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Adverse effects	0	0	1	3	3	0	0	0	0	1	0	0	0	0	0	0	8
	(0.0%)	(0.0%)	(25.0%)	(100.0%)	(50.0%)	(0.0%)	-	(0.0%)	(0.0%)	(16.7%)	-	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(21.6%)
Source confirmed HIV negative	0	1	2	1	2	0	0	0	0	1	0	0	0	2	0	0	9
	(0.0%)	(100.0%)	(50.0%)	(33.3%)	(33.3%)	(0.0%)	-	(0.0%)	(0.0%)	(16.7%)	-	(0.0%)	(0.0%)	(50.0%)	(0.0%)	(0.0%)	(24.3%)
B. All other exposure cases																	
Adverse effects	0	0	0	1	0	0	0	2	1	0	1	3	2	2	0	0	12
	-	-	-	(50.0%)	(0.0%)	(0.0%)	-	(50.0%)	(20.0%)	(0.0%)	(11.1%)	(60.0%)	(16.7%)	(20.0%)	(0.0%)	(0.0%)	(11.7%)
Source confirmed HIV negative	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
	-	-	-	(0.0%)	(0.0%)	(0.0%)	-	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(20.0%)	(0.0%)	(0.0%)	(1.9%)

Table 27. Promptness and completion of HIV PEP among exposures to known HIV positive source

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
Number with PEP prescribed	0	0	1	0	3	0	0	2	1	3	0	1	0	0	3	1	15
	-	(0.0%)	(100.0%)	-	(100.0%)	-	-	(100.0%)	(100.0%)	(100.0%)	-	(100.0%)	-	-	(100.0%)	(100.0%)	(100.0%)
Median time lag of PEP (hours)	0	0	2.7	0	1.9	0	0	5.35	8	40	-	1.7	-	-	2	47	4
PEP within 2 hours	0	0	0	0	2	0	0	0	0	1	-	1	-	-	2	0	6
	-	-	(0.0%)	-	(66.7%)	-	-	(0.0%)	(0.0%)	(33.3%)	-	(100.0%)	-	-	(66.7%)	(0.0%)	(40.0%)
PEP within 24 hours	0	0	1	0	3	0	0	2	1	1	-	1	-	-	3	0	12
	-	-	(100.0%)	-	(100.0%)	-	-	(100.0%)	(100.0%)	(33.3%)	-	(100.0%)	-	-	(100.0%)	(0.0%)	(80.0%)
Completion of PEP	0	0	1	0	2	0	0	2	1	2	-	1	-	-	3	1	13
	-	-	(100.0%)	-	(66.7%)	-	-	(100.0%)	(100.0%)	(66.7%)	-	(100.0%)	-	-	(100.0%)	(100.0%)	(86.7%)
B. All other exposure cases																	
Number with PEP prescribed	0	0	0	0	1	1	0	2	3	5	1	3	5	4	10	8	43
	-	-	-	-	(100.0%)	(100.0%)	-	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)
Median time lag of PEP (hours)	0	0	0	0	13.3	21	0	38.58	56	23	41.3	14.25	26.3	14	22.5	20.5	22
PEP within 2 hours	0	0	0	0	0	0	0	0	0	1	-	1	0	0	1	0	3
	-	-	-	-	(0.0%)	(0.0%)	-	(0.0%)	(0.0%)	(20.0%)	-	(33.3%)	(0.0%)	(0.0%)	(10.0%)	(0.0%)	(7.0%)
PEP within 24 hours	0	0	0	0	1	1	0	1	1	3	-	2	2	4	6	5	26
	-	-	-	-	(100.0%)	(100.0%)	-	(50.0%)	(33.3%)	(60.0%)	-	(66.7%)	(40.0%)	(100.0%)	(60.0%)	(62.5%)	(60.5%)
Completion of PEP	0	0	0	0	0	1	0	1	3	4	1	1	4	3	10	8	36
	-	-	-	-	(0.0%)	(100.0%)	-	(50.0%)	(100.0%)	(80.0%)	(100.0%)	(33.3%)	(80.0%)	(75.0%)	(100.0%)	(100.0%)	(83.7%)

Table 28. Seroconversion of HBV, HCV and HIV among cases with available pre- and post-exposure serology

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure																	
HBsAg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)
Anti-HCV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anti-HIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)
B. All other exposure cases																	
HBsAg	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	(0.0%)	(25.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.1%)
Anti-HCV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anti-HIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.5%)	(0.0%)	(0.0%)

Table 29. Proportion of new cases who completed scheduled management

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
A. Health care workers with occupational exposure	1	1	4	3	6	1	0	3	1	6	0	1	1	4	3	2	37
	(3.3%)	(0.8%)	(2.4%)	(1.9%)	(3.8%)	(1.0%)	(0.0%)	(3.4%)	(1.0%)	(7.0%)	(0.0%)	(1.3%)	(1.3%)	(4.2%)	(3.1%)	(2.0%)	(2.3%)
B. All other exposure cases	0	0	0	2	2	2	0	4	5	8	10	5	12	11	22	22	105
	(0.0%)	(0.0%)	(0.0%)	(0.7%)	(0.9%)	(0.9%)	(0.0%)	(1.3%)	(1.8%)	(3.0%)	(3.0%)	(1.7%)	(3.8%)	(3.1%)	(5.9%)	(5.9%)	(2.3%)

Table 30. Route of exposure for persons on PEP (mid 1999-2014)

	1999 (Jul-Dec)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	PEP Total
	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	On PEP	
A. Health care workers with occupational exposure																	
Percutaneous injury	2 (66.7%)	2 (100.0%)	6 (100.0%)	4 (100.0%)	6 (75.0%)	1 (100.0%)	1 (100.0%)	2 (66.7%)	2 (100.0%)	4 (66.7%)	0 -	3 (75.0%)	1 (100.0%)	3 (75.0%)	2 (66.7%)	1 (50.0%)	40 (80.0%)
Mucosal contact	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (33.3%)	0 -	0 (0.0%)	0 (0.0%)	1 (25.0%)	1 (33.3%)	1 (50.0%)	6 (12.0%)
Contact with non-intact skin of the injured	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 -	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (4.0%)
Contact with intact skin of the injured	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 -	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (4.0%)
human bite	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 -	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Others	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 -	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
B. All other exposure cases																	
Percutaneous injury	0 (0.0%)	3 (75.0%)	2 (50.0%)	4 (100.0%)	1 (25.0%)	3 (60.0%)	2 (100.0%)	4 (57.1%)	2 (20.0%)	3 (23.1%)	1 (7.7%)	4 (57.1%)	2 (12.5%)	1 (9.1%)	4 (12.9%)	11 (35.5%)	47 (28.8%)
Mucosal contact	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (28.6%)	0 (0.0%)	1 (9.1%)	1 (3.2%)	0 (0.0%)	4 (2.5%)
Contact with non-intact skin of the injured	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	1 (7.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (6.5%)	0 (0.0%)	5 (3.1%)
Contact with intact skin of the injured	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.2%)	1 (0.6%)
human bite	0 (0.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (7.7%)	0 (0.0%)	1 (6.3%)	1 (9.1%)	0 (0.0%)	0 (0.0%)	5 (3.1%)
Sexual	1 (100.0%)	0 (0.0%)	2 (50.0%)	0 (0.0%)	2 (50.0%)	1 (20.0%)	0 (0.0%)	3 (42.9%)	7 (70.0%)	9 (69.2%)	11 (84.6%)	1 (14.3%)	13 (81.3%)	8 (72.7%)	24 (77.4%)	19 (61.3%)	101 (62.0%)
Others	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (00%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

ACKNOWLEDGEMENT

Acknowledgement is due to the nursing and statistical staff of the Therapeutic Prevention Clinic who showed great dedication to the care of patients and compilation of data. We are also indebted to the laboratory support of the Public Health Laboratory Service Branch of the Centre for Health Protection, and the collaboration with the Central Coordinating Committee of Accident and Emergency Services of the Hospital Authority. Our service delivery will continue to depend on their generous support. Last but not least, we are grateful to Dr WONG Tin-yau of the Infection Control Branch of the Centre for Health Protection for his input in the preparation of this report.

ABBREVIATIONS

AIDS	Acquired immunodeficiency syndrome
A&E Department	Accident & Emergency Department
BBV	Blood-borne viruses
CDC	Centers for Disease Control and Prevention, US
CHP	Centre for Health Protection
HBIg	Hepatitis B immunoglobulin
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HCW	Health care worker
HIV	Human immunodeficiency virus
ITC	Integrated Treatment Centre
NRTI	Nucleoside reverse transcriptase inhibitor
PEP	Post exposure prophylaxis
PI	Protease inhibitor
TPC	Therapeutic Prevention Clinic

REFERENCES

1. Bell DM. Occupational risk of human immunodeficiency virus infection in healthcare workers: An overview. Am J Med 1997;102(suppl 5B):9-15.

2. Ippolito G, Puro V, De Carli G, the Italian Study Group on Occupational Risk of HIV Infection. The risk of occupational human immunodeficiency virus infection in health care workers. Arch Intern Med 1993;153:1451-8.

3. Anon. Needlestick transmission of HTLV-III from a patient infected in Africa. Lancet 1984;ii:1376-7.

4. Occupational Health Protection Agency Centre for Infections & Collaborators. Occupational transmission of HIV. Summary of published reports. March 2005.

5. Gerberding JL. Management of occupational exposures to blood-borne exposures. Engl J Med 1995;332:444-51.

6. US CDC. Recommendations for follow-up of health care workers after occupational exposure to hepatitis C virus. MMWR. 1997;46:603-6.

7. Health Protection Agency, Health Protection Services; Public Health Wales; Public Health Agency Northern Ireland; Health Protection Scotland. Eye of the needle. United Kingdom surveillance of significant occupational exposure to bloodborne viruses in healthcare workers. London: Health Protection Agency. December 2012.

8. Cardo DM, Culver DH, Ciesielski CA, et al. A case-control study of HIV seroconversion in health-care workers after percutaneous exposure. N Engl J Med 1997;337:1485-90.

9. US CDC. Updated US Public Health Service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for post exposure prophylaxis. MMWR 2001;50:RR-11.

10. US Public Health Service Working Group. Updated US Public Health Services guideline for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. Infect Control Hosp Epidemiol 2013;34:875-92.

11. UK Health Department. Updated guidance on occupational HIV post-exposure prophylaxis (PEP) from the UK Chief Medical Officers' Expert Advisory Group on AIDS (EAGA). Last updated 29 April 2015.

12. Cresswell F, Waters L, Briggs E, et al. UK guideline for the use of HIV post-exposure prophylaxis following sexual exposure (PEPSE), 2015. Int J STD AIDS Online First, published on April 19, 2016 as doi:10.1177/0956462416641813

13. US CDC. Updated guidelines for antiretroviral postexposure prophylaxis after sexual, injectiondrug use, or other nonoccupational exposure to HIV — United States, 2016. Available at https://stacks.cdc.gov/view/cdc/38856, accessed on 29 June 2016.

14. Ford N, Mayer KH; for the World Health Organization Postexposure Prophylaxis Guideline Development Group. World Health Organization guidelines on postexposure prophylaxis for HIV: recommendations for a public health approach. Clin Infect Dis 2015;60(S3):S161-4.

15. Scientific Committee on AIDS &STI (SCAS), and Infection Control Branch, Centre for Health Protection, Department of Health. Recommendations on the management and postexposure prophylaxis of needlestick injury or mucosal contact to HBV, HCV and HIV. January 2014.

16. Scientific Committee on AIDS & STI (SCAS), Centre for Health Protection, Department of Health. Using antiretrovirals for post exposure prophylaxis against HIV in the non-occupational setting — positional statement of the SCAS. March 2006.

17. Hospital Authority. A&E clinical guideline No. 6. Management of needlestick injury or mucosal contact with blood or body fluid. March 2016.

18. Joyce MP, Kuhar D, Brooks JT. Occupationally acquired HIV infection among health care workers — United States, 1985-2013. MMWR 2015;63:1245-6.

19. Jason J. Community-acquired, non-occupational needlestick injuries treated in US emergency departments. J Public Health 2013;35(3):422-30.

20. Schechter M, do Lago RF, Mendelsohn AB, et al. Behavioural impact, acceptability, and HIV incidence among homosexual men with access to postexposure chemoprophylaxis for HIV. J Acquir Immune Defic Syndr 2004; 35(5):519-25.

21. Armishaw J, Hoy JF, Watson KM, et al. Non-occupational post-exposure prophylaxis in Victoria, Australia: responding to high rates of re-presentation and low rates of follow-up. Int J STI AIDS 2011;22(12):714-8.

APPENDIX. HIV infection and health care workers.

HIV Manual, third edition (2013) Chapter 34 (Available at www.hivmanual.hk).

Ka Hing WONG, Shui Shan LEE, Ada Wai Chi LIN

Introduction

The main routes of HIV transmission, namely, sexual contact and needle-sharing in injection drug users, are closely associated with risk behaviours in the community. The health care setting is not a *natural* location for HIV transmission in epidemiologic perspective. HIV transmission may however occur through needlestick injuries in hospital or other clinical services. The risk of HIV transmission through such injury is between 0 to 0.46%, while that for mucosal membrane is one log lower at 0.09%, and that for non-intact skin (abrasion) is even lower. Though the risk is infinitesimal, this is undoubtedly an exceedingly emotional issue. The contexts in the discussion of the subject of HIV infection in health care workers include the size of the potential problem, and the effectiveness of specific intervention measures.

How many health care workers have been infected as a result of occupational exposure? In the US, as of the end of 2013, 208 health care workers (58 documented, and 150 possibly acquired) have contracted HIV after occupational exposure, against the background of a huge number of percutaneous injuries sustained. Only one documented occupationally acquired HIV case has been reported since 1999. Over 90% of HIV infected health care workers have had no previous occupational exposure risk to account for the infection. There is no international database for estimating the size of the problem in global perspective, though, apparently, this is small. There is however the risk of transmission through contaminated blood transfusion or invasive clinical procedures, the incidence of which has not been well established.[1] In Hong Kong, no occupationally acquired HIV infections have yet been diagnosed nor suspected.

In the event that a needlestick injury has occurred, specific measures are often demanded to reduce the chance of infection. Antiretroviral medicines may theoretically be useful as there is a time lag between exposure and infection. Inhibition of viral replication shortly after exposure may therefore be one means of protecting from subsequent infection. The scientific basis of such practice, now widely known as post-exposure prophylaxis (PEP), has come from animal models with simian immunodeficiency virus exposure. PEP initiated 72 hours after exposure in animal models is often ineffective. In human, a retrospective case-control study of health care workers who sustained percutaneous injury in health care setting has demonstrated an 81% (95% confidence interval: 48-94%) reduction in the risk of infection following the use of zidovudine. However, there is not a standard protocol which has proven

to be most effective. Delay to treatment access is often the rule rather the exception. In the clinic setting, it's a test of practicality and a balance between risk and benefit when it comes to decision making.

The objective of addressing HIV/AIDS in health care setting is a matter of promoting a harmonious workplace, rather than a priority prevention strategy. The key principle is to adopt an anticipatory and systematic approach, so as to minimise any potential disruption to the health service implicated. This chapter presents an overview of recommended practices, the principles of which have been adopted by the Scientific Committee on AIDS and STI, and the Hong Kong Advisory Council on AIDS. This chapter covers firstly the issue of HIV prevention in health care setting, followed by recommendations on the management of occupational exposure. The unique situation of an HIV infected health care worker is addressed in the last part of the chapter.

HIV prevention in health care setting

Standard precaution is a core part of infection control practices pertaining to HIV prevention in health care setting. ***Standard precaution*** is defined as a "set of precautionary measures including good hand hygiene practices and the use of protective barriers during routine patient care". This concept is similar to that embodied in the term "universal precaution" which was normally applied to the handling of selected body fluids in the prevention of bloodborne infections. Standard precaution encompasses measures for the handling of blood, body fluids, secretion and excretions, and the avoidance of contamination of non-intact skin and mucous membrane.

Standard precaution implies that "all patients are treated as if they have a bloodborne virus (BBV), such as HIV or HBV (hepatitis B virus)", and are therefore treated no differently between patients. The concept is different from situations which demand the application of extra infection control precautions, when, for example, an infection is spread by droplets, air or close contacts. In such circumstances, a different concept, that of transmission based precaution, is advocated. Standard precaution covers:

a. handwashing before and after patient contact;

b. wearing protective barriers when there's a direct contact or potential contact with blood or body fluids, mucous membrane and non-intact skin of patients (masks and other protection are to be worn as appropriate if splashing is anticipated);

c. safe handling of sharps, avoiding for example, recapping.

Standard precaution should be practised as part and parcel of a broader system for promoting workplace safety. In this connection, the following list of supporting items, adapted from the Guidance Note published under the HNP (Health, Nutrition and Population) Discussion Paper series of World Bank, shall be referred to: (a) reducing the chance of exposure; (b) engineering control; (c) effective staff supervision and education; (d) proper waste management; (e) attention to occupational health and safety issues; and (f) surveillance of incidents and development of outcome indicators on infection control. It would also be desirable to integrate HIV prevention with mechanisms for the prevention of other BBV infections, for example HBV. The principles are identical, while some elements like that of the role of vaccination could be unique for particular virus.

Post-exposure management

The risk of HIV transmission through occupational injuries is small. This should not however be translated to according a lower priority for quality post-exposure management. The Scientific Committee on AIDS and STI, in conjunction with the Infection Control Branch, Centre for Health Protection, Department of Health, have proposed a set of guiding principles on the effective management following exposure (summarised in Box 34.1).These principles are founded on the need for a systematic approach to the issues. The management of an incident of occupational exposure involves first aid measures, proper risk assessment, counselling tailored to the need of the injured, HIV testing according to standard protocol, and the prescription of antiretrovirals if the risk is significant. The exposure would often be managed first by the respective hospital's Accident and Emergency Department, and then referred to designated clinic for follow up post-exposure management. However, each clinical institution should have its protocol on the prevention and management of occupational exposure to blood or body fluids, as part of its infection control or occupational safety programme. Confidentiality of the exposed staff should be ensured, including reporting of incident. An algorithm at the end of this chapter is proposed for easy reference.

Box 34.1 Guiding principles on the management of occupational exposure to HIV

An INTEGRATED approach that takes in collectively the most important bloodborne infections to date, i.e. HBV, HCV and HIV.

Emphasis on RISK ASSESSMENT and COUNSELLING, embodying a case-by-case evaluation, including consideration of the specific option for PEP.

Evidence-based practice that incorporates scientific principles, international developments and local perspectives.

Risk assessment

No two occupational injuries in health care setting are identical. Two sets of factors should be considered in assessing the risk of an exposure, which deal with firstly, patient status, and secondly nature of exposure. Exposure to an HIV positive patient who has progressed to AIDS carries a higher risk of HIV transmission than that for an asymptomatic patient. The amount of virus in the body, and therefore, the blood/body fluid, constitutes one major factor of HIV transmission. As for the nature of exposure, exposure through percutaneous injury predisposes one to a higher risk than through mucous membrane or non-intact skin (for example, abrasion). A high volume of blood, deep injury and the use of a hollow needle (versus solid needle) are other factors associated with a higher chance of viral transmission. Urine, vomit, saliva and faeces are low risk body fluids, the exposure to which does not require PEP unless they are visibly blood-stained. Other factors can be considered in the assessment - the wearing of gloves can effectively reduce the extent of exposure; the exposure to blood in the environment that has begun to dry up would also mean a lower risk of infection.

Risk assessment is rarely a simple procedure. Risk for transmission varies with the type and severity of the exposure, including the following considerations:

a. Infection status of source - higher risk with symptomatic disease or AIDS with known high viral load.

b. Exposure type for percutaneous injuries - higher risk associated with a device visibly contaminated with patient's blood, deep injury, and procedure involving a needle used in patient's artery or vein.

c. Type of exposure substance - generally higher risk for blood exposure as compared with exposure to other body fluids or tissues.

HIV post-exposure counselling and testing

Post-exposure counselling is an important component of the management procedures following occupational injuries involving a source patient that is HIV positive or of unknown status. Counselling is provided in the same setting and in conjunction with risk assessment, and lead naturally to a decision on blood testing and post-exposure prophylaxis. The main purpose of the counselling is to enable the injured health care worker to make an informed decision on the management procedure to be adopted. Subjects to be covered include, inter alia:

a. exploration of underlying risk of infection unrelated to the injury, for example, sex and injection drug use;

b. assessment of current HIV status, especially if one has previously been tested for HIV;

c. symptomatology of seroconversion illness, which may occur with acute HIV infection, usually at 2-6 weeks following exposure;

d. precautionary measure, for example, safer sex, withholding blood/organ donation, avoidance of pregnancy;

e. toxicity and drug interactions of antiretroviral drugs in PEP.

A baseline HIV antibody test is needed for most of the injured persons. The result serves as a reference for interpreting subsequent blood results, especially in the event of suspected seroconversion after the exposure. A negative result excludes pre-existing HIV infection if window period is unlikely. Baseline tests for other bloodborne infections for, say, HBV and HCV serology, would be indicated as appropriate.

Testing of the source person may theoretically assist in the formulation of strategy, but is a complicated aspect of the management protocol. The ethical dimensions of obligation to inform, need-to-know, confidentiality are seldom a simple issue to be resolved. As a rule of thumb, testing of the source person, if performed, should be undertaken after clear explanation and with consent obtained not by the injured but another member of the health care team. Confidentiality should be upheld. For infection status that cannot be ascertained, HIV prevalence of the background community could be useful for assessment. Locally, the prevalence is estimated to be <0.1% in the general adult population, if the source does not belong to any of the risk populations and without other clues suggestive of underlying infection.

For diagnostic purpose, it is noted that HIV test is a two-step procedure comprising a screening test and a confirmatory assay. It may be perceived as too time-consuming when urgent result (of, source person, injured person or both) is desirable. One might have to act upon the result of the screening test alone, the implications of which need to be thoroughly and carefully conveyed. The alternative would be that of a rapid test, which has received more attention in the recent years. A rapid test, especially one performed on whole blood, offers one means of obtaining an urgent result but needs confirmation if reactive. The specificity of such test may be higher than that of a standard screening ELISA, but is not a replacement of a full two-step test for clinical diagnosis and management.

The antiretroviral PEP

A combination of at least 3 drugs is recommended for PEP in Hong Kong, a practice adopted by US CDC and World Health Organization as promulgated in their latest recommendations. Treatment, if indicated, should be initiated as soon as possible, and preferably within 24 to 36 hours. The normal duration of PEP is 4 weeks. In the case of a delay in consultation and where the risk is substantial, initiation of PEP beyond 72 hours following injury may be considered. Two nucleoside reverse transcriptase inhibitors (NRTI) plus one protease inhibitor (PI) is the most widely used highly active antiretroviral regimen for PEP. Zidovudine, lamivudine, combivir, tenofovir, emtricitabine and truvada are the NRTIs to be used while boosted darunavir is the PI preferred though other PIs can be used. Apart from boosted PI, integrase inhibitor or the newer NNRTIs including etravirine and rilpivirine may be considered as alternatives to be used with the 2-NRTI backbone. Some antivirals have to be avoided in PEP setting due to toxicity or inadequate data, e.g. nevirapine, stavudine. In choosing between the regimens, the followings are considered:

a. toxicity profile of individual drug and regimen, and potential interaction between the drugs and other medicines that the injured might be taking concurrently;

b. other medical condition that the injured might have;

c. known or possible resistance pattern in the source or the community;

d. pregnancy.

Follow-up assessment and management

Irrespective of whether PEP has been prescribed, follow-up counselling and evaluation is indicated, alongside repeat blood testing. For those on PEP, incompletion of the full course is not uncommon. The injury could be an exceptionally stressful event requiring considerable expert support and counselling. In evaluating the situation and the provision of counselling, the following shall be covered:

a. advice on completion of full course of treatment;

b. side effects that may arise from the PEP, and their management, and drug switch;

c. seroconversion illness which may occur and necessary action;

d. need for precautionary measures in health care setting;

e. other preventive advice including safer sex.

Repeat HIV antibody testing shall be performed at 3 to 6 months following injury. Additional testing at earlier or longer interval may be considered if indicated, to evaluate, for example, possible acute retroviral syndrome. Other investigations, for example, complete blood picture, renal and liver function tests, sugar level, amylase, creatinine kinase may be performed, the selection of which depends on the profile of antiretroviral drugs that are prescribed.

The HIV infected health care worker

There have so far been four reports of HIV transmission from an infected health care worker to patients(s) - a Florida dentist, French orthopaedic surgeon, French nurse and Spanish gynaecologist. The risk is small, and is attributable to "exposure-prone procedure" (EPP), a concept that has changed over years. In principle this encompasses procedures involving a potential risk of HIV transmission from a health care worker to a patient. The UK Department of Health has described this as in Box 34.2.

On the other hand, procedures undertaken while the worker's hand/fingers are clearly visible and are outside a patient's body, or when internal procedures do not involve injury, are not considered exposure-prone. Specific examples are taking blood (venepuncture); setting up and maintaining intravenous lines or central lines; minor surface suturing; the incision of external abscesses; routine vaginal or rectal examinations; and simple endoscopic procedures.

Box 34.2 Exposure prone procedures (UK Department of Health. HIV infected health care workers: guidance on management and patient notification. London: Department of Health, 2005)

Exposure prone procedures are those invasive procedures where there is a risk that injury to the worker may result in the exposure of the patient's open tissues to the blood of the worker (bleed-back). These include procedures where the worker's gloved hands may be in contact with sharp instruments, needle tips or sharp tissues (e.g. spicules or bone or teeth) inside a patient's open body cavity, wound or confined anatomical space where the hands or fingertips may not be completely visible at all times. However, other situations, such as pre-hospital trauma care should be avoided by health care workers restricted from performing exposure prone procedures, as they could also result in the exposure of the patient's open tissues to the blood of the worker.

The following perspectives refer when addressing HIV infection in a health care worker: preventive measures in health care setting; duties and obligations of health care workers, public health responses. These have been adapted from the guidelines established by the Hong Kong Advisory Council on AIDS in 1994. The principles have remained the same when the document was reviewed in 2003. The Guidelines were last revised and updated in 2013.

HIV prevention in health care setting - the case of an infected health care worker

The infection control practice described in the early part of the chapter is applicable irrespective of the HIV status of health care workers. This is in keeping with the principle of

universal precaution, or standard precautions. Sound infection control practice with appropriate quality assurance should be implemented at all levels, taking into consideration factors unique to individual setting.

Rights and responsibilities of an HIV infected health care worker

Confidentiality is a key issue. Health care workers are not required to disclose their HIV status to their employers or clients. There are, however, occasions where the HIV status has to be made known on a need-to-know basis, and this will normally be with the consent of the infected worker. For example, doctors or specialists involved in evaluating an infected health care worker may need to know his HIV status. In exceptional circumstances, breach of confidentiality may be warranted, for instance when an HIV infected health care worker refuses to observe the restrictions and patients have been put at risk.

Health care workers should receive **counselling and HIV antibody testing** if they have reason to suspect that they have been infected. An HIV infected health care worker should seek appropriate counselling and to act upon it when given. With antiretroviral treatment advances and good prognosis of early HIV diagnosis continued with appropriate treatment and care nowadays, there is clear benefit of early HIV testing followed by proper clinical management to the health of individuals (including health care workers) who may have been exposed to HIV. It is unethical if one fails to do so as patients are put at risk. The attending doctor of an HIV-infected health care worker should seek the advice of the expert panel formed by the Director of Health on the areas of management and possible need for job modification. The doctor who has counselled an HIV infected colleague on job modification and who is aware that the advice is not being followed and patients are put at risk, has a duty to inform the Medical/Dental Council for appropriate action.

The status and rights of an HIV infected health care worker as an employee should be safeguarded. Currently there is no justification for **restricting practice** of health care workers on the basis of the HIV status alone. Restriction or modification, if any, should be determined on a case-by-case basis. If work restriction is required, employers should make arrangement for alternative work, with provision for retraining and redeployment.

An effective public health response

The Department of Health has formed an **Expert Panel** to advise the attending physician of the infected health care worker on whether job modification, limitation or restriction is required. A case-by-case evaluation would be undertaken considering multiple factors that can influence risk and work performance. The concept of EPP would be used in assessing the need for job restriction. For specific cases, the Panel may not recommend restriction of EPP

by an infected health care worker who is on stable treatment, with fully suppressed viral load continuously, and maintenance of good health with regular monitoring and evaluation by the attending doctor. The attending doctor of the HIV infected health care worker should consult the Panel through its Secretary, the Consultant of the Special Preventive Programme, Centre for Health Protection, Department of Health (phone number: 3143 7289). The referral is anonymous and all information is treated in strict confidence.

HIV infection and AIDS are not notifiable diseases by law in Hong Kong, and reporting is on a voluntary basis. Worldwide **patient notification** has been conducted following reports of exposure prone procedure involving HIV infected health care workers. In the UK, this has ceased to be an automatic process. The need for such exercise is determined on a case-by-case basis, a principle that has also been adopted in Hong Kong. The first recommended lookback was conducted in Hong Kong in 2012, with no positive case identified.

Finally, the issue of HIV transmission in health care setting has caused much **public concern** despite the minimal risk incurred. Undue focusing on health care setting in fact deflects the society from proper attention to the major transmission routes through sex and injection drug use. The health care profession has the duty of constantly reassuring the public, and to educate their clients on how HIV can and cannot be contracted. More importantly, the public looks on the health care profession as an example of how HIV/AIDS should be dealt with. By adhering to the guidelines for prevention of HIV infection in the health care setting, public fear can be allayed.

Algorithm 34: Management of occupational exposure to HIV