

## **HIV and Health Care Workers (Adapted from HIV Manual www.hivmanual.hk)**

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***CME / CNE / PEM point accreditation*** (*please refer to the attached test paper for the number of credit points awarded*)

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### **Introduction**

HIV is transmitted predominantly by sexual contact and needle-sharing in people who inject drug (PWID), and is thus closely associated with risk behaviours in the community. In some parts of the world, mother-to-child transmission is also important. Although the health care setting is not a natural location for HIV transmission from the epidemiologic perspective, it can occur through needlestick injuries or other exposures associated with patient care. It is estimated that a health care worker (HCW) exposed to a needlestick involving HIV-contaminated blood has a 0.23% risk of becoming infected. It is increased to 0.41% if the source patient has AIDS or is symptomatic<sup>1</sup>. Exposure through mucous membrane carries a risk one log lower at 0.09%, and that for non-intact skin (abrasion) it is even lower. Although the risk is small, every exposure provokes anxiety.

As of end of 2013, there had been 58 confirmed and another 150 possible occupationally acquired HIV infections in the US. Remarkably, only one confirmed incident occurred after 1999 which involved a laboratory technician exposed parenterally to a live culture of HIV. The rarity of recent transmissions could be attributed to a combination of effective infection control, use of HAART in suppressing viraemia, and post-exposure management<sup>2</sup>. There is no systematic international database to size the relative scale of the problem but it is likely small. In Hong Kong, no confirmed or suspected occupationally acquired HIV infection has been reported.

In the event that a needlestick injury occurs, there are specific measures that can further reduce the chance of infection beyond general wound care. Antiretroviral medications should be expeditiously administered to take advantage of the time lag between exposure and establishment of infection. The scientific basis of this practice, now known as post-exposure prophylaxis (PEP), originated in studies of animals exposed to simian immunodeficiency virus. These studies provided proof-of-concept for PEP. They further showed that the later PEP was initiated, the less effective it would be. After 72 hours, it would likely be futile. They also suggested a minimum treatment duration of 28 days. In humans, a retrospective case-control study of parenterally exposed health care workers demonstrated an 81% (95% CI, 48-94%) reduction in the risk of infection following the use of zidovudine alone<sup>3</sup>. Even before there were official guidelines, PEP with zidovudine was practised in the late 1980s. Over the years, it has become accepted and recommended practice.

The importance of addressing HIV transmission in the health care setting cannot be overstated. In the early days of the HIV epidemic, there was extreme anxiety as to how HIV could be effectively prevented in the health care setting. This led to incidents of unnecessary and arguably discriminatory practice against patients known to be HIV infected, and in turn reluctance of many to undergo HIV testing or disclose their status to health care providers. It was against this backdrop that the concepts of Universal and later Standard Precautions emerged.

### **HIV prevention in health care setting**

Standard Precautions is now the mainstay of infection control practices pertaining to HIV prevention in the health care setting. It is defined as a "set of precautionary measures including good

hand hygiene practices and use of protective barriers during routine patient care",<sup>4</sup> and is essentially a synthesis of Universal Precautions and Body Substance Isolation (BSI). As originally defined by US CDC in 1985, Universal Precautions applied only to blood and body fluids that had been implicated in the transmission of blood borne infections. It did not apply to faeces, nasal secretions, sputum, sweat, urine or vomitus, all of which however were included under BSI.

Standard Precautions encompasses precautions in the handling of blood, *all* body fluids, secretions and excretions (except sweat); and avoidance of contamination of non-intact skin and mucous membrane. The precautions are standard and undertaken with the premise that "all patients are treated as if they have a bloodborne virus, such as HIV or hepatitis B virus". Knowledge of the HIV status of the source patients is irrelevant. Where there are concerns about infections spread by droplet, air or close contacts, appropriate transmission-based precautions will have to be added to Standard Precautions.

More specifically, Standard Precautions covers

- handwashing before and after patient contact;
- protective barriers for 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);
- sharps handling, including avoidance of recapping; and
- handling of patient care equipment

It is part and parcel of the broader system of ensuring safety in the workplace. To this end, multiple other efforts should also be made for (a) reducing the chance of exposure, (b) implementing engineering controls, (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.<sup>5</sup> It is also desirable to integrate prevention of HIV with that of other bloodborne infections. The principles are essentially the same, with the notable exception that vaccination is available for hepatitis B.

## Post-exposure management

Although the risk of HIV transmission through occupational injuries is small, this does not trivialise post-exposure management. Since 2003, local guidelines have been issued by the Department of Health. They are underpinned by, inter alia, two important principles for effective management and a systematic approach to the issue.<sup>6</sup>

- A. An integrated approach should be adopted that collectively addresses the important bloodborne infections, i.e. hepatitis B virus, hepatitis C virus and HIV
- B. Risk assessment and counselling constitute the basis of post-exposure management which leads to specific options of post-exposure prophylaxis when appropriate. Case by case evaluation is crucial

Most hospitals have vetted internal protocols to provide expedited management of exposure incidents. It begins with first aid measures which are followed by proper risk assessment, counselling tailored to the need of the exposed, HIV testing according to standard protocol, and the prescription of antiretrovirals if the risk is significant. In practice, the exposed HCW is managed first in the Accident and Emergency Department, and then referred to designated clinics for follow up post-exposure management. Management protocols may differ with each institution, but not in principles. 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 (**Algorithm**).

### ***Risk assessment***

Each incident of occupational exposure is unique. 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 (see **Box**). Exposure to a patient with HIV 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, 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.

#### **Box.** Major considerations in risk assessment

- Infection status of source - higher risk with symptomatic disease or AIDS with known high viral load.
- 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.
- 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 with HIV 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 PEP. The main purpose of counselling is to enable the exposed HCW to make an informed decision on the management procedure to be adopted. Subjects to be covered include:

- 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 potential for drug-drug interactions.

A baseline HIV antibody test is needed for most of the exposed. 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 unless there is strong suspicion that the exposed HCW is undergoing seroconversion. Baseline tests for other bloodborne infections, e.g. HBV and HCV serology, would be indicated as appropriate.

Testing of the source person may theoretically assist in the formulation of strategy, but can be a complicated aspect of the management protocol. The ethical dimensions of obligation to inform, need-to-know, and confidentiality may be in conflict with one another and difficult to resolve. 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 exposed HCW but by 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 the HIV test is a two-step procedure comprising a screening test and a confirmatory assay. It may be perceived as too time-consuming when an urgent result (of, source person, exposed 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. Alternatively, a rapid test, especially one performed on whole blood, offers one means of obtaining an urgent result although confirmation is still necessary if reactive. Depending on the test employed, the rapid test may even have a higher specificity than that of a standard screening ELISA, but it still cannot replace the standard two-step test for diagnosis and management.

### ***The antiretroviral PEP***

A combination of at least three drugs for 28 days is recommended for PEP in Hong Kong, consistent with recommendations by US CDC<sup>7</sup> and World Health Organization. Treatment, if indicated, should be initiated as soon as possible, and preferably within 24 to 36 hours. Where the risk is substantial, initiation of PEP beyond 72 hours following exposure may be considered with the awareness that this is likely to be futile. The combination of two nucleoside reverse transcriptase inhibitors (NRTI) plus one protease inhibitor (PI) or one integrase strand transfer inhibitor (INSTI) is the most widely used regimen for PEP. Non-nucleoside reverse transcriptase inhibitors (NNRTI) is regarded only as an alternative choice because of the relatively high prevalence of primary resistance, the likelihood of hypersensitivity, and its adverse effect profile. Nevirapine is particularly prone to toxicity for HIV negative individuals and is contraindicated for PEP.

Zidovudine, lamivudine, Combivir®, tenofovir and Truvada® are all acceptable options for NRTIs. Tenofovir alafenamide (TAF) cannot be recommended at this time because of insufficient clinical experience for PEP. For PI, boosted darunavir and lopinavir are preferred. For INSTI, raltegravir is well tolerated and preferred by many institutions. Of note, dolutegravir should generally be avoided by women of childbearing age because of its potential for teratogenicity.

Besides immediate availability, there are other considerations in the choice of PEP

- A. toxicity profile of individual drug and regimen, and potential interaction between the drugs and other medicines that the exposed might be taking concurrently;
- B. other medical conditions of the exposed;
- 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, failure to complete the 4-week course is not uncommon.

The exposure 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. The need to adhere to the 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 exposure. 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 case of the HIV infected health care worker**

The infection control practices as described apply irrespective of the HIV status of the HCW. Where they are properly adhered to, the risk of HIV transmission from an untreated HCW with HIV to his patients is extremely low even for the most invasive procedures (one in a few million) and negligible for others. With the availability of effective antiretroviral treatment, the very low risk is now infinitesimal.

Nevertheless, HIV transmission from HCW to patients has occurred. Worldwide, there have been four reports; a Florida dentist, a French nurse, a French orthopaedic surgeon, and a Spanish gynaecologist. The route of transmission for the dentist and nurse could not be ascertained, while the other two involved high-risk exposure prone procedures. None of these HCW was on treatment.

### ***Exposure prone procedures***<sup>8</sup>

Transmission may conceivably occur when injury to the infected HCW results in his blood contaminating the patient's open tissues. This is called bleed-back. Procedures carrying the risk of bleed-back are also called exposure prone procedures (EPP). With EPPs, the worker's gloved hands may be in contact with sharp instruments, needle tips or sharp tissues 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. All EPPs are not the same as far as risks are concerned. 'Invasive' is not necessarily 'exposure prone' either.

As corollary to the above description, non-EPPs are those where the hands and fingertips of the worker are visible and outside the patient's body, and those which do not involve possible injury to the worker's gloved hands. They include venipuncture, setting up central lines, skin suturing, incision of external abscesses, endoscopic procedures, etc. In actuality, most HCW do not perform EPPs. In Hong Kong, where job modification may need to be considered, the advice of the Department of Health should be sought (see Expert Panel).

### ***Lookback investigations***

Worldwide, patient notification exercises have been conducted following reports of EPP involving HCW with HIV. However, most if not all these lookback investigations failed to find any positive case. In the UK, over 30 lookback investigations involving 10 000 patients did not identify any case of transmission. Similarly, in the US, lookback investigations involving more than 22 000 patients of 51

HCW with HIV failed to find a case of transmission. In Hong Kong, one lookback investigation involving 132 patients was conducted in 2012 without any positive case.<sup>9</sup> These results further supported the miniscule risk of HCW-to-patient transmission.

### ***Job restriction or modification***

To further reduce the risk to patients, certain HCW with HIV may be required to alter or limit their work practice. This usually applies only to those who carry out high risk EPPs. Where job modification is required, the employer should make arrangement for alternative work with provision of retraining if required. However, with effective therapy being available, most authorities nowadays tend to allow HCW with HIV to perform EPP as long as they are virally suppressed.

## **Roles of the medical profession**

All HCW are ethically obligated to safeguard the health of their patients. In its Code of Professional Conduct, the Hong Kong Medical Council requires that a doctor who is a ‘carrier of a serious infectious disease ... take the necessary steps to prevent the spread of infection to his patients and others.’ Similar views are expressed by other professional bodies. Since 1994, specific guidance related to HCW with HIV has been published by the Advisory Council on AIDS.<sup>10</sup> Some of the important principles are highlighted as below.

***Professional ethics*** - HCW should seek counselling, testing and follow up if suspicious of being infected with HIV. Those with HIV should expeditiously seek, receive and adhere to care, in order to maintain optimal health and prevent spread of infection to others, patients included. To this end, antiretroviral therapy is essential and should be taken by the HCW.

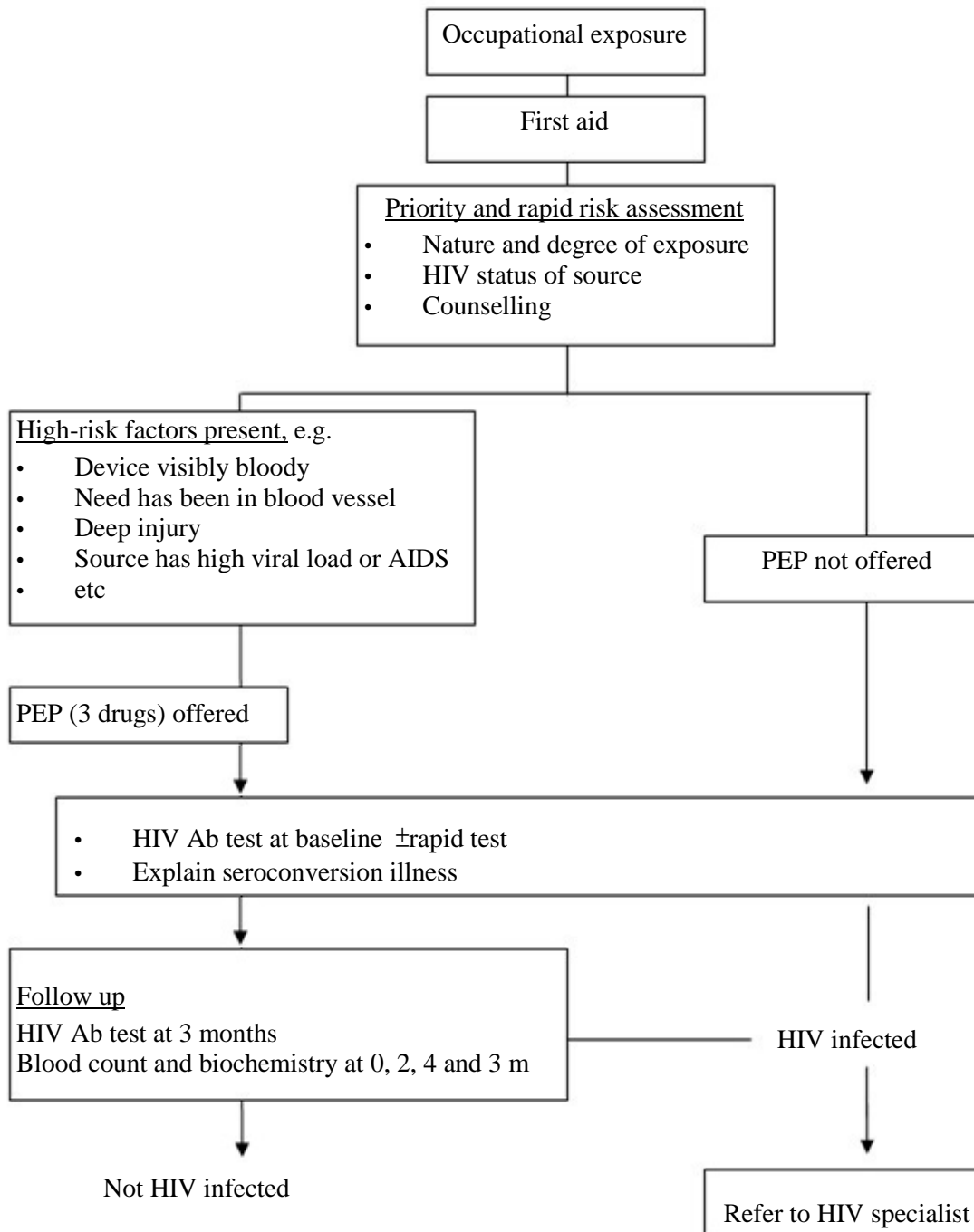
***Confidentiality*** - HIV is not a notifiable disease in Hong Kong. The Hong Kong Medical Council also stipulates that ‘doctors involved in the diagnosis and treatment of HIV infection or AIDS must endeavor to ensure that all allied health and ancillary staff, e.g. In laboratories, fully understand their obligation to main confidentiality at all times’. The same standard extends to those patients who are HCW. However, the right to confidentiality is not absolute. For instance, breach of confidentiality by his attending doctor is warranted if an HCW with HIV fails to observe job restrictions and puts patients at risk.

***Expert Panel on HIV Infection of Health Care Workers (Expert Panel)*** – The Expert Panel was formed by the Department of Health in 1994 to advise the attending physician of an HCW with HIV on whether job modification is required. In addition, it examines the need of conducting public health intervention for cases assessed. Each case is evaluated on its own merits. Multiple factors are taken into consideration, including his work environment, health status, work performance, etc. In particular, the performance of EPP is assessed. The attending doctor of an HCW with HIV may make referral to the Panel through its secretary (Consultant of Special Preventive Programme) at 3143 7289. Referral is anonymous and all information kept in strict confidence. The Panel received its first referral in 1999. As of 2018, 71 HCW had been assessed.

***Information dissemination to HCW*** – It is important that all HCW be aware of their rights and responsibilities in so far as HIV infection is concerned. Related information should preferably be disseminated as early as the student enters study of a health care profession. An HIV diagnosis per se does not automatically lead to job restriction. Each and every case is different and should be evaluated on an individual basis.

***Professional responsibilities*** – The mere possibility of HIV transmission in the healthcare setting has invited oversized public scrutiny and heated debate. This is unfortunate as it detracts society from attending to the much more important means of transmission by sex and sharing of injecting equipment. It should be emphasised that the health care profession has a special responsibility to educate patients and society at large on how HIV is acquired and prevented. Health professionals should lead by example in showing how a person with HIV is treated with respect. HCW with HIV should also follow their professional and ethical requirements. Ultimately, the health care profession should continue to maintain a safe health care environment for their patients by following all guidelines for prevention of HIV infection.

**Algorithm. Management of occupational exposure to HIV**





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**Test paper - HIV and Health Care Workers (Adapted from HIV Manual  
[www.hivmanual.hk](http://www.hivmanual.hk))**

Expiration Date: 1 December 2020

**CME point # / CNE point: 1 / PEM point: 0 (Midwifery related)**

- Please choose the best option.
- Answer these on the answer sheet and make submission by fax to Special Preventive Programme, Department of Health.

*# Please contact respective authorities directly for CME/CPD accreditation if it is not on listed below.*

Accreditors	CME Point
Department of Health <i>(for practising doctors who are not taking CME programme for specialists)</i>	1
Anaesthesiologists	1
Community Medicine	1
Dental Surgeons	1
Emergency Medicine	1
Family Physicians	1
Obstetricians and Gynaecologists	pending
Ophthalmologists	1
Orthopaedic Surgeons	0
Otorhinolaryngologists	pending
Paediatricians	1
Pathologists	1
Physicians	1
Psychiatrists	1
Radiologists	1
Surgeons	1

1. After needlestick exposure to a source patient known to be HIV infected, which of the following information does NOT contribute to estimating the risk of transmission?
  - (a) The magnitude of HIV viral load of the source patient
  - (b) Known history of HIV drug resistance
  - (c) Whether the needle was visibly contaminated with blood before puncture
  - (d) Whether the needle had been used for venipuncture or intramuscular injection
  - (e) The disease stage of the source patient
  
2. A nurse, after a needlestick injury involving blood from a patient, was started on Truvada and Kaletra® (boosted lopinavir) as PEP at 24 hours after the incident. Three days later, she developed vomiting and diarrhoea. Which of the following approaches is reasonable?
  - (a) You reassure her that these symptoms are associated with Kaletra®, and stress to her the importance completing the regimen unchanged for 28 days to achieve maximum effectiveness.
  - (b) The symptoms are likely related to Kaletra®. You replace Kaletra® by raltegravir for a total treatment duration of 31 days.
  - (c) The symptoms may be explained by HIV seroconversion. You add raltegravir to the regimen to prevent breakthrough of HIV infection with resistance.
  - (d) The symptoms are likely related to PEP. You withhold PEP for 48 hours before restarting it with additional medications to alleviate symptoms.
  - (e) None of the above

3. Which of the following is covered by Standard Precautions (SP)?
  - (a) Hand hygiene before and after patient contact
  - (b) Wearing gloves for contact with blood or body fluids
  - (c) Avoiding recapping of needles
  - (d) Using needleless devices for injection
  - (e) All of the above
4. Which of the following about occupational HIV post-exposure prophylaxis (PEP) is false?
  - (a) PEP administered after 72 hours is futile
  - (b) PEP is given for 4 weeks if administered between 24 to 72 hours, and 2 weeks if administered within 24 hours
  - (c) Nevirapine is contraindicated for PEP because of a high risk of hepatotoxicity
  - (d) Confidentiality of the exposed and source patient should be ensured
  - (e) The possibility of being pregnant may affect the choice of PEP
5. Which of the following about nosocomial HIV transmission is true?
  - (a) Provider-to-patient HIV transmission has not been reported in Hong Kong
  - (b) Bleed back is the mechanism of provider-to-patient HIV transmission
  - (c) Standard Precautions is the mainstay of prevention
  - (d) Accidental needlestick carries a small risk of HIV transmission
  - (e) All of the above
6. Which of the following about Standard Precautions (SP) is true?
  - (a) SP covers precautionary measures including good hand hygiene practices and use of protective barriers during routine patient care
  - (b) SP is automatically triggered when a positive HIV diagnosis of the patient is made known to health care staff
  - (c) SP has been supplanted by Universal Precautions
  - (d) Where the suspicion of open tuberculosis exists, airborne precautions will replace SP
  - (e) In SP, double gloving is employed when a patient exhibits signs and symptoms of HIV seroconversion
7. Under normal circumstances, which of the following procedures is considered exposure prone?
  - (a) Phlebotomy
  - (b) setting up a subclavian central line
  - (c) incision of a 5 cm abscess over the scalp
  - (d) Repair of an episiotomy wound
  - (e) Upper endoscopy
8. Which of the following is not within the remit of the Expert Panel on HIV Infection of Health Care Workers?
  - (a) Evaluates if exposure prone procedure is or has been performed by the health care worker
  - (b) Examines the need of public health intervention such as a look back investigation
  - (c) Determines the appropriate combination of antiretroviral therapy for the infected health care worker
  - (d) Recommends on the need of job modification
  - (e) Assesses the health status of the infected health care worker

9. Which of the following characterises the referral and review process of the Expert Panel on HIV Infection of Health Care Workers?
- (a) The Expert Panel is charged with the mandate of following all known HIV infected health care workers
  - (b) The HIV infected health care worker is required to attend the initial hearing by the Expert Panel
  - (c) The Expert Panel keeps log of all patients with invasive procedures done by the HIV infected health care worker
  - (d) For HIV infected surgeons who perform highly invasive procedures, the Expert Panel will provide their names to the Medical Council but in a fully confidential manner
  - (e) None of the above
10. To reduce the risk of provider-to-patient HIV transmission, which of the following strategies is NOT employed in Hong Kong?
- (a) Referral of an infected health care worker to an Expert Panel for case by case evaluation
  - (b) Antiretroviral treatment of the infected health care worker for viral suppression
  - (c) Standard Precautions for all patients in the health care setting
  - (d) Education of medical students on the ethical responsibility to safeguard the health of patients
  - (e) Universal, opt-out, testing of health care workers belonging to the surgical specialties