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Risk Control Countermeasures in HIV Occupational Exposure for Healthcare Workers and Police Officers

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Abstract

In recent years, due to changes in the social governance environment, there have been a number of causative factors that should not be overlooked in relation to HIV occupational exposure among health care workers and front-line workers who handle HIV-infected crime cases in China. Beijing Normal University project team deploys the satisfaction with the effectiveness for occupational exposure prevention and control on the special police brigade, in search of more feasible risk control countermeasures. In contrast to the "lack of protection knowledge and skills" and the "fluke mentality about the risk of exposure", it is more important to pay attention to the social discrimination and other factors that cause some people with HIV to "deliberately conceal their exposure" and even "commit the crime of malicious transmission". In the prevention and risk control of HIV occupational exposure, we should aim for "zero infection", fully implement the concept of "universal protection", refine the rules of safe disposal of sharp instruments, clarify the principles of timely treatment, comprehensive reporting, confidentiality and informed consent after exposure, strengthen life education, anti-discrimination and de-stigmatization education, and improve the special support fund and insurance provisions for occupational exposure.

Keywords

Occupational Exposure, Changes in Causative Factors, Universal Protection, Post-Exposure Prophylaxis

1. Introduction

Since 1984, when the UK Health Protection Agency reported the world's first

case of HIV infection due to occupational exposure, the risk of infection due to contact with patients carrying infectious viruses in clinical practice has gradually become an occupational concern in the healthcare field. The World Health Organization (WHO) has always advocated and recommended the concept of "universal protection", which means that when providing medical services, either the blood or body fluids of patients or healthcare workers, regardless of whether the other party is HIV negative or positive, should be considered a potentially infectious source of exposure.[1] However, with the spreading trend of HIV transmission and other illegal and criminal behaviors, HIV occupational exposure has not been strictly curbed as expected, and profound changes are taking place among the population at risk, and in terms of exposure incidents, actual triggers, et al. Not only in China but also globally, many police officers have been pierced by needles or other sharp instruments contaminated with virus-containing body fluids or blood when arresting HIV-infected or AIDS patients (hereinafter referred to as people with HIV) suspected of committing crimes. The threat of more insidious occupational exposure has also emerged in some cases of juvenile delinquency, due to the need for confidentiality protection. In the Chinese medical field and the law enforcement field of the public security judiciary, there has been some active exploration of risk control for occupational exposure, especially prevention knowledge, protection skills, and emergency treatment. However, from the data on occupational exposure, there is still a long way to go to achieve the goal of "zero infection" and meet the "universal protection" standard. [2]Among them, systematic reflection on the structural factors behind some exposure accidents reveals that these accidents were caused by the failure to adjust risk control countermeasures in a timely manner in response to changes in causative factors.

2. Presentation of Problems

2.1. Statement of Problem

Currently, healthcare workers involved in HIV prevention and treatment as well as police officers who have "zero contact" with people with HIV in the course of arrests, admissions or supervision are the most at risk of occupational exposure in all countries. Internationally, many high-risk populations face a number of real pressures and specific risks. In the traditional research, the prevention and control of occupational exposure risks has focused on statistics and analysis of needlestick situations among healthcare workers. For example, a study by the US Occupational Safety and Health Administration (OSHA) showed that approximately 600,000 needlestick episodes occur in healthcare workers each year (Zhang et al., 2006).

[1]See World Health Organization (WHO) Prevention and Treatment of HIV and Other Sexually Transmitted Infections for Sex Workers in Low-And-Middle-Income Countries: Recommendations for a Public Health Approach (2012 edition).

[2]See China Health and Family Planning Commission Regulations on Procedures for the Management of Occupational Exposure to HIV (2015 edition).

In China, the cause of preventing and controlling occupational exposure has experienced a 20-year development path, but it started late in the field of occupational disease protection. In December 2013, the National Health and Family Planning Commission and four other departments jointly issued a new version of the *Classification and Catalogue of Occupational Diseases*. Compared to the *2002 Catalogue of Occupational Diseases*, it expanded the number of occupational diseases from 115 to 132, with the addition of the entry "AIDS (limited to medical and health personnel and people's police)" to the classification of occupational infectious diseases. The purpose and intent of the revision at the time was to alleviate and dispel the fears of medical and police personnel and to emphasis the need for special care and attention.

In recent years, judging from some publicly disclosed local research results and adjudication documents of some cases, there is still a certain gap between the prevention and treatment of occupational exposure risks and relevant work deployment.[3] For example, among the publicly disclosed HIV occupational exposures in Dehong Dai and Jinpo Ethnic Minorities Autonomous Prefecture, Yunnan Province, 323 cases occurred between 2010 and 2015, and 225 cases occurred between 2016 and 2020 (Wang et al., 2022); among the registered HIV occupational exposures in Chongqing, 714 cases occurred between 2015 and 2017 (147, 264 and 303 cases in each consecutive year) (Ding, 2019). These local data show that the task of preventing and treating occupational exposures remains relatively serious.

2.2. Research Methods

In view of the effectiveness and satisfaction for prevention and treatment of occupational exposure, the author's project team from Beijing Normal University conducted a comprehensive interview and questionnaire survey with police officers from the Z and D Specialized Management Brigades of the judicial administration drug treatment system in S province, who are responsible for the supervision of people with HIV. The subjects of the study were selected according to the occupational exposure risk defined in the Guidelines for AIDS Diagnosis and Treatment in China, including brigade leaders, police officers, auxiliary police, medical staff, etc. The project team collected 27 valid questionnaires in total. Focusing on the specific problems, the project team interviewed 20 front-line staff in the special brigade by non-structured interview. From the interview materials and anonymous satisfaction surveys, it was found that the implementation of the mechanism to prevent and deal with occupational exposure was generally "satisfactory", but 33.33% and 29.6% of the respondents were "dissatisfied" respectively (**Table 1**). During the interviews, criticism and suggestions were focused on the fact that some police officers are exposed to long periods of close contact with carriers of high-risk infectious diseases in a very closed working

[3]The data were obtained from the National Key Region AIDS Prevention and Control Project (Health Office Disease Control Issue [2004] No. 49) and the National Science and Technology Major Project (2018ZX10721102-004).

Table 1. Survey on satisfaction with the effectiveness for occupational exposure prevention and control by the s. provincial specialized control brigade.[4]

	Indicators	*Satisfied*	*Not satisfied*
Effectiveness for prevention and control of risk factors	Pre-exposure prophylaxis	18 (66.7%)	9 (33.3%)
	Post-exposure disposal mechanisms	19 (70.4%)	8 (29.6%)

environment, and are vulnerable to the health right from complications such as tuberculosis and candidiasis (oesophagus, trachea and bronchus). This poses a challenge to the setting of the scope of diseases caused by occupational exposure. Relevantly, among those who are actually at risk of occupational exposure, in addition to the people's police officers who are formally on the payroll, the relevant auxiliary police officers, prosecutors, judges, duty lawyers, judicial social workers, psychological counselors and others have expressed similar concerns.

3. Follow-Up Analysis for Recent Contributing Factors of Occupational Exposure

According to the 2021 UN General Assembly High Level Meeting on AIDS, there is now a broader consensus that effective HIV prevention strategies require a combination of behavioral, biomedical and structural interventions. Specifically in the case of occupational exposure, oral medicines for post-exposure prevention or post-exposure blocking (PEP) should be taken as soon as possible following high-risk behaviour (i.e. the PEP programme). What are the current contributing factors that may lead to occupational exposure and infection?

3.1. Failure to Fully Implement the Concept of "Universal Protection"

Lessons from some cases are that healthcare workers either are not aware of the risks, or not taking the lead in fully implementing the concept of "universal protection", or not able to anticipate the possible consequences of HIV exposure in a timely manner, and lack scientific knowledge on the "golden time" for timely interruption.[5] For example, in the aforementioned statistics from Chongqing, there were 19 cases of "no standardized topical treatment" (15 of which were healthcare workers) and 9 cases of "no topical treatment at all" (Ding Yuexu et al., 2019). Based on local clinical experiences, the best time to take HIV blocking drugs is two hours after high-risk exposure, i.e. within 2 hours, preferably not more than 24 hours. The "golden time" is also recommended as 72 hours. How-

[4]The number of people's police officers interviewed and questioned by the Beijing Normal University project team was 27. The questionnaire set up a "dilemma" situation in which the question concerned be judged on the opposing values of "satisfied" and "dissatisfied". The disadvantage of this set-up is that it omits the options including "difficult to judge" or "intermediate". Its statistical advantage is that it uses the positive and the negative as coordinates to uncover the interviewers' intrinsic tendencies and collect qualitative judgment.

[5]See Chinese Society of Infectious Diseases Guidelines for AIDS Diagnosis and Treatment in China (2021 edition).

ever, by re-analysis, I found that in the aforementioned local data from Chongqing and Yunnan, less than 50% of the healthcare workers took medicine within the optimal time of 2 hours (Figure 1). Another example is that in the case of "Zeng's eyes splashed with patient's blood" in S province, which I studied, the main cause was that Zeng neither wore gloves, nor a mask with impermeable properties and protective glasses during the operation, as required by Article 5 of the "*Guiding Principles of Protective Work*" to perform the operation.

3.2. "Active Disengagement", "Treatment Failure", etc. May Lead to Insidious Exposure

Even more problematic is the fact that, simultaneously with some reassuring achievements in the areas of mother-to-child interruption technology, post-exposure prophylaxis and the effectiveness of antiretroviral treatment, another risk of transmission and exposure is quietly occurring in the field of HIV epidemiology. In 2014, the World Health Organization stated in *Post-exposure Prophylaxis for the Prevention of HIV Infection* that timely post-exposure prophylaxis can reduce the risk of infection by up to 89%. Objectively, mortality rates are decreasing year on year as viral loads are largely able to be effectively suppressed. For many people with HIV, factors such as acquired drug resistance, high baseline viral load, drug interactions or malabsorption, drug abuse and mental health can

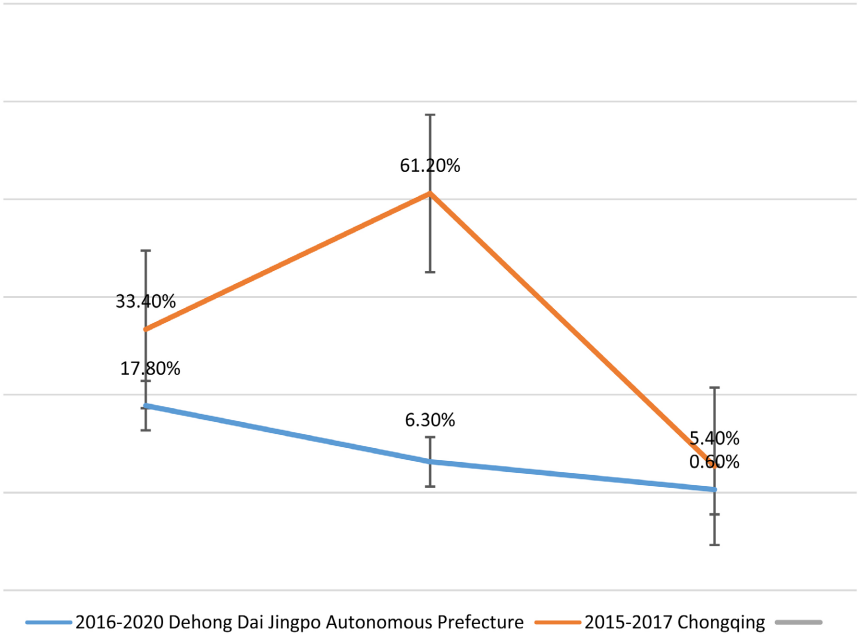

Figure 1. Timing of medication taking after HIV occupational exposure: re-analysis based on two local samples.[6]

[6]Because of differences in the variable design of the two aforementioned statistical studies (the variables for the 2016-2020 Dehong study were: no medication, within 2 h, 2 h - 24 h, and more than 24 h; the variables for the 2015-2017 Chongqing study were: within 2 h, 2 h - 24 h, 24 h - 72 h, and more than 72 h), the two overlapping variables were selected for comparison in this chart.

all contribute to "treatment failure". Among these factors, the problem of "active disengagement" and escape from regulated treatment is more serious in some places, due to misconceptions, adverse reactions and the limitations of the new coronavirus epidemic. Once these situations are not closely tracked, there is a risk of more insidious occupational exposure for healthcare workers, case handlers and volunteers who have close contact with people with HIV.

3.3. Social Discrimination and Other Factors That Curb Active Disclosure of Illness

Proactive disclosure is the best preventional strategy for healthcare workers and police officers. In reality, many people with HIV have a tendency to conceal their condition. Why does this problem arise? After HIV infection, there are many conflicts between the right to know and the personal information and privacy of people with HIV. According to Articles 38 and 39 of the *HIV Prevention and Control Regulations*, people with HIV are obliged to following compulsory notification duties: 1) accept epidemiological investigations and guidance from disease prevention and control agencies or entry-exit inspection and quarantine agencies; 2) promptly inform those with whom they have sexual relations of the fact of infection or illness; and 3) when seeking medical treatment, truthfully inform the doctor of the fact of infection or illness. As a result, in practice, many front-line case handlers are unable to be informed of the illness of suspected offenders in a timely manner due to information asymmetry. Even the guardians of some juvenile with HIV are included in the scope of the non-disclosure obligation. In some cases involving new types of drugs and juveniles with homosexual friendships, some prosecutors and judicial social workers, when conducting social investigations, wanted to have full information on HIV testing in order to accurately assess the social risk, but were refused by the local centers of disease control.

In addition, due to social discrimination and other factors, some "labelled" people with HIV are prone to silently revise their "self-image", gradually accepting the negative judgments given by the public, thus turning themselves into a complete "outsider", or even a so-called "bad person", and committing even worse transgressions and eventually fall deeper and deeper into the trap (Howard, 2011). Factors such as social discrimination can easily lead to stigmatization, labelling people with HIV as "unclean" or "morally corrupted" who therefore are unequally treated. Some people with HIV fear being abandoned by friends and family, dismissed by employers, or discouraged from school if they come forward with information about their condition. This, coupled with the confidential nature of HIV information, can encourage subconscious avoidance of answers, or even concealment and denial.

3.4. Crime of Malicious Dissemination Occurs from Time to Time

According to the *2019 Guiding Opinions on Severely Combatting the Spread of HIV and Other Illegal Crimes* jointly issued by the Supreme People's Court, the

Supreme People's Procuratorate, the Ministry of Public Security and the Ministry of Justice, in recent years, many criminals have taken advantage of the public's fear of AIDS to impersonate or use the identity of HIV-infected or sick people, using blood falsely claiming to contain or containing HIV as a tool to chasing, intercepting or intimidating others, committing extortion, provocation, obstruction and other illegal conducts or crimes. The use of HIV-positive bodily fluids to threaten case officers is an aggravated form of malicious communication and may lead to serious occupational exposure. In the case of "*Zhang disrupting the order of supervision*", Zhang, an HIV-positive person, forcibly broke out of the confinement cell during detention and bit police officer Tang on his right hand, bleeding. After a diagnosis, Tang was found to have been occupationally exposed to HIV.[7] In the places where people with HIV are admitted or supervised, and where there is "zero distance" contact, the risk of occupational exposure will be greatly increased if the concept of "HIV infection ends with me" is not established, and if "dead corners" are not eliminated in the areas of human, technical and physical security.

4. Countermeasures and Reform Proposals for Prevention and Control of Occupational Exposure

The best protection advice for HIV occupational exposure is to strictly follow the concept of "universal protection". In China's S Province judicial administration drug rehabilitation system, for example, even though occupational exposure has occurred, through timely and effective management, the goal of "zero infection" has been achieved in the last ten years. What improvements should be made in terms of risk prevention, post-exposure treatment and support measures to address the aforementioned problems?

4.1. Refining Rules for the Safe Disposal of Sharp Instruments

Given that an important route of exposure to HIV continues to be the pricking or cutting of the skin, or the resulting malicious transmission of body fluids containing the virus, it is vital to enhance the safe handling and risk prevention of sharp instruments. In addition to the traditional approach of wearing protective devices, refining procedures and strengthening personal protection based on the concept of "universal protection", a more cutting-edge approach is to improve the engineering controls involved, and minimize the use of needles in all procedures of intravenous infusion care operations. No additional action is required to activate needle tip protection devices, no needles at the front end during puncture, no needle connections at the back end during infusion, etc. The use of devices designed for automatic handling of sharps can be further promoted in the healthcare system to isolate the operator from and reduce the risk and to fully implement the use of safe needles instead of common ones.[8]

[7]See Chongqing Yuzhong District (2015) Zhong District Law Criminal Initial No. 00282.
[8]See the US Infusion Nurses Society (INS) Standards of Practice for Infusion Therapy (2016 edition).

4.2. Implementing the "Four Principles" after Exposure Occurred

Most occupational exposures occur unexpectedly at the spatial and temporal level. The handling of accidental exposures should follow the principles of timely disposal, comprehensive reporting, confidentiality and informed consent. The relevant units should set up an emergency response leadership team to be responsible for the prevention and control of HIV occupational exposures, strengthen human, material, financial, drug and technical reserves, and enhance emergency response capabilities. In accordance with the requirements of "early detection, early reporting, early assessment, early medication and regular follow-up", once occupational exposure is detected, rapid response, treatment and interruption should be achieved. In special cases, such as those with underlying illnesses, poor immune function or co-infection, the follow-up period for HIV antibody testing can be extended appropriately. Based on the principle of comprehensive reporting, the causes and consequences of exposure can be fully reported to the relevant authorities for comprehensive support including follow-up medical, legal, psychological support and others. After the exposure has occurred, those who are informed should maintain strict confidentiality for the person concerned and should not disclose the infection to outsiders and unrelated persons in violation of Article 38 of the *HIV Prevention and Control Regulations*. To reinforce procedural involvement, the person concerned should be informed of the relevant precautions and risks before the provision of prophylactic, interceptive and therapeutic medicines, and should only use them after he/she has given his/her knowledge and consent.

4.3. Strengthening Life Education and Education for Anti-Discrimination as Well as De-Stigmatization

In many cases, risk factors from people with HIV themselves are an important trigger for occupational exposure, and thus, a comprehensive, in-depth and dynamic understanding of the psychological status and outlook of people with HIV is needed. For these people, life education should be reinforced to help them develop the concept of "HIV infection ends with me"; for the public, anti-discrimination and de-stigmatization education should be further improved. This is the ultimate resolution. Many treatment and supervision centers are actively exploring life education through classroom-based teaching, interest groups and other forms. For example, in Sichuan Province, the "Ice-Blossom" life education programme at the D Institute of the Judicial Administration Drug Rehabilitation System has a core mission of helping people with HIV to develop empathy and an awareness of the "red line" against endangering the lives and health of others (**Table 2**).

In addition, cases with regard to stigmatization and discrimination need to be closely monitored and actively assisted to defend their rights. To "correct" some of the social prejudices, people with HIV can be encouraged and supported to work in "STD and AIDS Care Associations" and related volunteer organizations,

Table 2. The "ice-blossom" special life education curriculum.

Unit Themes	Featured Courses	Course Objectives
Cherishing life	Mental Health Counselling	Gradual recovery of psychological functions
	Sports Interest group	Gradual recovery of physiological functions
Respecting life	Common Diseases and Prevention	Accepting the reality of HIV infection
	Gardening Interest Group	Appreciating the value of growth in life
Loving life	Philosophy and Culture Lessons	Taking the right attitude towards drug rehabilitation
	Self-control Training	Maintaining good conduct
	Singing Interest Group	Singing the love of life
Revering life	History, Geography and Culture Lessons	Developing a sense of social responsibility
	Dance Interest Group	Keeping life strong in exercise
	Performance Interest group	Cultivation of collaboration capabilities

to advise or participate in services on behalf of similar groups of people, to help in effective prevention and education work.

4.4. Improving the Special Support Fund and Insurance Provisions for Occupational Exposure

At present, the insurance industry's definition and scope of benefits for "critical illness insurance" are broadly limited to "occupational exposure of health care workers and police officers" and infections resulting from "blood transfusion" and "organ transplantation". Generally speaking, persons suffering from AIDS will be denied coverage for "critical illness insurance"; the insured person will not be covered if he or she is diagnosed with AIDS during the period of insurance. From the perspective of public interest and state responsibility, it is recommended that the "critical illness insurance" be extended to cover working people who are professionally exposed to people with HIV, and that the insurance payout is extended to cover the treatment of related complications. In addition to this, the scope of work-related injuries should be further improved and a special support fund for occupational exposure should be established, relying on industry. Currently, some establishments in the judicial and administrative drug rehabilitation system have raised funds by their own to establish an occupational exposure pension fund for civilian police officers, and receive donations from caring social enterprises and individuals. It is recommended that the fund be expanded to cover all aspects of the relevant industry, and that the sources of the fund be expanded to increase the amount of preferential treatment and pensions.

To sum up, on the basis of following the concept of "universal protection", it is necessary to strengthen the safe disposal and risk prevention of sharp instruments combined with recent contributing factors, and minimize risks by isolating the operator from them. In case of accidental exposure, rapid response, treatment, interruption and comprehensive medical, legal, psychological and other support are provided. The key is that in all links, life education, anti-discrimination and de-stigmatization education should be paid attention to all the time, so as to help people with HIV develop empathy and awareness of the "red line" that endangers the life and health of others.

5. Conclusion

Traditional causation analysis has focused on propositions such as "patient responsibility theory", "technical responsibility theory" and "social responsibility theory". Nowadays, the analysis of different types of causes allows for a comprehensive understanding of the characteristics of recent causes and the implementation of precise and targeted prevention and treatment, which can reduce the discrepancy in social input and output. The increasing secrecy of "deliberately concealed" causes and the unpredictability of the occurrence of "malicious transmission" pose a serious challenge to the implementation of the concept of "universal protection". In a social environment where internal and external discrimination are compounded, uncovering the hidden causative factors of occupational exposure remains a multidimensional and complex area. The prevention and treatment of HIV occupational exposure require the integration of medical, sociological, psychological, educational, legal and other multidisciplinary knowledge to achieve the sharing of industry, academia and research, and the linking of service resources.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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