Occupational Exposure to HIV among Healthcare Workers: Experience at Siriraj Hospital

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Abstract :

Objective : **To evaluate the incidence and epidemiological data concerning occupational exposure to HIV among healthcare workers (HCWs) at Siriraj Hospital.**

Method : **We prospectively collected data concerning occupational exposure among HCWs at Siriraj Hospital using a self-reporting system from 1994 to 2001. All exposed individuals were followed up for at least 6 months after exposure.**

Results : **During the years 1994-2001, there were 691 incident reports from 670 individuals, 180 males and 490 females. The groups of HCWs exposed to blood and other body fluids consisted of : - 152 (22.0%) nurses, 147 (21.3%) medical students, and 119 (17.2%) externs. Needlestick or sharps injuries accounted for 538 (77.9%) cases, while the number exposed to mucous membranes was 93 (13.5%). The remaining 28 (4.1%) cases were of broken skin and 32 (4.6%) cases of intact skin exposure. Venepuncture was the procedure with highest risk of producing injury (20.7%). The incidents mostly occurred on medical wards 156 (22.6%) cases, operating rooms 121 (17.5%) cases, and in the emergency room 111 (16.1%) cases. The HIV status of the sources was positive in 230 (33.3%) cases, negative in 315 (45.6%) cases, and unknown in 146 (21.1%) cases. Postexposure prophylaxis was given in 206 (29.8%) cases. In terms of HIV seroconversion, only 172 (27.3%) out of 629 cases reported back negative results for anti-HIV at the 6 month follow-up.**

Conclusion : **Occupational exposure to HIV at Siriraj Hospital occurred most frequently among nurses, medical students, and externs as needlestick or sharps injuries on medical wards. According to our data up to this time, no one seroconverted or claimed compensation for work-related HIV infection.**

Key words : Occupational exposure, healthcare workers, HIV, needlestick, postexposure prophylaxis.

เรื่องย่อ : **อุบัติเหตุทางการแพทย์ต่อการติดเชื้อไวรัสเอชไอวี: ประสบการณ์ในโรงพยาบาลศิริราช**

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วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์และลักษณะการเกิดอุบัติเหตุทางการแพทย์ที่ทำให้มีโอกาสติดเชื้อไวรัสเอชไอวีในโรงพยาบาลศิริราช

วิธีการศึกษา: ผู้วิจัยได้รวบรวมรายงานของบุคลากรที่ได้รับอุบัติเหตุทางการแพทย์ที่สัมผัสเลือดหรือสิ่งคัดหลั่งของผู้ป่วยในโรงพยาบาลศิริราชระหว่าง ปี พ.ศ.2537-2544 และติดตามผลเลือดของบุคลากรผู้นั้นเป็นเวลาอย่างน้อย 6 เดือนว่ามีการติดเชื้อเอชไอวีจากอุบัติเหตุนั้นหรือไม่

ผลการศึกษา: ระหว่างปี พ.ศ.2537-2544 ในโรงพยาบาลศิริราช มีอุบัติเหตุทางการแพทย์ทั้งสิ้น 691 ครั้ง จากบุคลากร 670 ราย เป็นชาย 180 ราย และหญิง 490 ราย บุคลากรที่ประสบอุบัติเหตุมากสามอันดับแรก คือ พยาบาล 152 (22.0%) ราย นักศึกษาแพทย์ 147 (21.3%) ราย และแพทย์ฝึกหัด 119 (17.2%) ราย จำแนกลักษณะการเกิดอุบัติเหตุเป็นการถูกเข็มและของมีคมตำหรือบาด 538 ราย (77.9%) การสัมผัสเลือดหรือสิ่งคัดหลั่งของผู้ป่วยโดยกระเด็นเข้าตา ปาก หรือจมูก 93 ราย (13.5%) การสัมผัสเลือดหรือสิ่งคัดหลั่งของผู้ป่วยทางผิวหนังเป็นแผล 28 ราย (4.1%) และผิวหนังที่ปกติ 32 ราย (4.6%) หัตถการที่เป็นสาเหตุของการเกิดอุบัติเหตุมากที่สุด คือ การเจาะเลือด (20.7%) นอกจากนี้พบว่าเกิดในหอผู้ป่วยอายุรศาสตร์มากเป็นอันดับแรกถึง 156 (22.6%) ตามด้วยห้องผ่าตัด 121 (17.5%) และห้องอุกเฉิน 111 (16.1%) ภาวะการติดเชื้อเอชไอวีของเจ้าของเลือดหรือสิ่งคัดหลั่งพบว่า 230 (33.3%) รายมี anti-HIV ให้ผลบวก, 315 (45.6%) รายมี anti-HIV ให้ผลลบ และ 146 (21.1%) รายที่เหลือไม่สามารถติดตามผลเลือดได้ บุคลากรที่ได้รับอุบัติเหตุเหล่านี้ได้รับยาต้านไวรัสเพื่อป้องกันการติดเชื้อเอชไอวี 206 ราย (29.8%) และมีเพียง 172 (27.3%) จาก 629 รายงาน ที่ได้มาติดตามตรวจ anti-HIV เมื่อ 6 เดือนหลังประสบอุบัติเหตุ โดยทั้งหมดได้ผลเป็นลบ

ข้อสรุป: อุบัติเหตุทางการแพทย์ในโรงพยาบาลศิริราชมักเกิดในกลุ่มพยาบาล นักศึกษาแพทย์ และแพทย์ฝึกหัด โดยส่วนใหญ่เป็นการถูกเข็มและของมีคมตำหรือบาดในหอผู้ป่วยอายุรศาสตร์ อย่างไรก็ตามจากข้อมูลรายงานที่มีอยู่จนถึงปัจจุบันยังไม่มีผู้ใดในโรงพยาบาลศิริราชมีการติดเชื้อเอชไอวีจากอุบัติทางการแพทย์

INTRODUCTION

An important route of human immunodeficiency virus (HIV) transmission is exposure to infected blood or other body fluids. Healthcare workers (HCWs) are at risk for occupational acquisition of HIV infection, basically due to percutaneous exposure. The cumulative risk of HIV infection after occupational exposures depends on several factors including the risk of HIV transmission after a single exposure, the prevalence of HIV-infected patients, and the frequency of exposure[1].

Combining data from several case reports and prospective studies have demonstrated that the risk of HIV infection after percutaneous exposures to HIV-infected blood in healthcare settings is approximately 0.32% (95% confidence interval [CI] = 0.20-0.50%)[2-6]. Although the risk after mucous membrane exposure is less precisely defined, it has been estimated at 0.09% (95%CI = 0.006-0.50%)[5]. The risk after skin exposure has not been correctly quantified but is theoretically less[3].

Since the HIV epidemic in Thailand started in 1989, the Thai authorities have collected extensive epidemiological data following the epidemic. The Thai Working Group on HIV/AIDS Projection estimated in March 2001 that approximately 984,000 people have been infected, and 695,000 people are currently living with HIV and AIDS. Importantly, they also predicted that around 55,000 HIV-infected people would develop serious HIV/AIDS-related illnesses in 2001 requiring medical care[7]. As a result, most hospitals in Thailand now encounter a large number of HIV-infected patients, especially in a tertiary care facility such as the Faculty of Medicine Siriraj Hospital. Therefore, healthcare workers in

Thailand have a high potential to be exposed to HIV-infected blood and other body fluids from individuals whose HIV status is known or unknown.

In terms of frequency of exposure, a survey of U.S. Hospitals in 1995 estimated that approximately 500,000 percutaneous blood exposures might occur annually among healthcare workers, and about 5,000 might be exposed to HIV-infected blood[8]. In Thailand, Pungpapong and colleagues have reported 200 incidents of occupational exposure from 198 Thai Red Cross Society HCWs during the period 1991-1997 and 137 out of these 200 were exposed to HIV-infected blood or body fluids[9]. Our report evaluates the magnitude of the problem and the epidemiological data regarding occupational exposure to HIV among Thai healthcare workers in a large university-hospital setting using data collected prospectively since 1994.

MATERIALS AND METHODS

As a part of occupational health policy for HCWs at Siriraj Hospital, since 1994 the Department of Preventive and Social Medicine has established an incident report and postexposure management system for occupational exposure to human blood products or other body fluids, which might be contaminated with HIV. In order to obtain evidence that HIV infection occurs in HCWs after an incident, all HCWs need to report the incident immediately to their supervisors and then consult an on-call infectious disease clinician to evaluate the severity of injury and the need for chemoprophylaxis against HIV infection. Pre and post-test counseling for postexposure are provided to any exposed HCWs as well as free chemoprophylaxis according to the standard of care[10]. Baseline HIV serological testing within a few days of the incident is required, and follow-up HIV testing is repeated at 3 and 6 months. All information concerning each incident is confidential. Any HCWs who seroconverts as a result of a work-related infection will be cared for by the hospital.

The incident report system requires self-report to the Division of Infectious and Immunodeficiency Diseases (Clinic 447), Department of Preventive and Social Medicine. The incident report form consists of the following information: demographic data, date and time of exposure, type or nature of exposure, place of exposure, the HIV-status of the exposed HCWs and the source, and recommended chemoprophylaxis if any. The follow-up HIV results are obtained as fully as possible and kept confidentially on another form.

RESULTS

The incidence of occupational exposure

There were 691 incident reports at Siriraj Hospital during the years 1994-2001, which were eligible for analysis. These 691 reports were from 670 individuals consisting of 180 males (26.9%) and 490 females (73.1%). Seventeen individuals had two incidents, and two individuals were exposed on three occasions. One of these had all three exposures when he was an extern. The annual incidence and sex of HCWs from 1994-2001 are shown in Figure 1. Approximately, 50 incidents per year were reported during the first five years. Thereafter, the number of reports significantly increased to 80 in 1999, 135 in 2000, and 217 in 2001.

Groups of healthcare workers and types of exposure

According to our data, the three groups of healthcare workers who were most likely to be exposed to blood or body fluids regardless of type of exposure were nurses 152 out of 691 (22.0%), medical students 147 out of 691 (21.3%), and externs 119 out of 691 (17.2%) (Figure 2).

Among 691 reports, 538 (77.9%) were due to needlestick or sharps injuries, and 93 (13.5%) were due to mucous membrane exposure to blood or body fluids including splashing into the eyes or mouth. There were also 28 (4.1%) reports of broken skin and 32 (4.6%) of intact skin exposure.

When the groups of HCWs was reclassified into a physician group (teaching staff, residents, externs, medical students), a nursing group (nurses, nurse-aids, nursing students), and a paramedic group (laboratory technicians, housekeepers, others), an analysis of the relationship between the groups of healthcare workers and types of exposure was performed. Needlestick or sharps injuries were the ma-

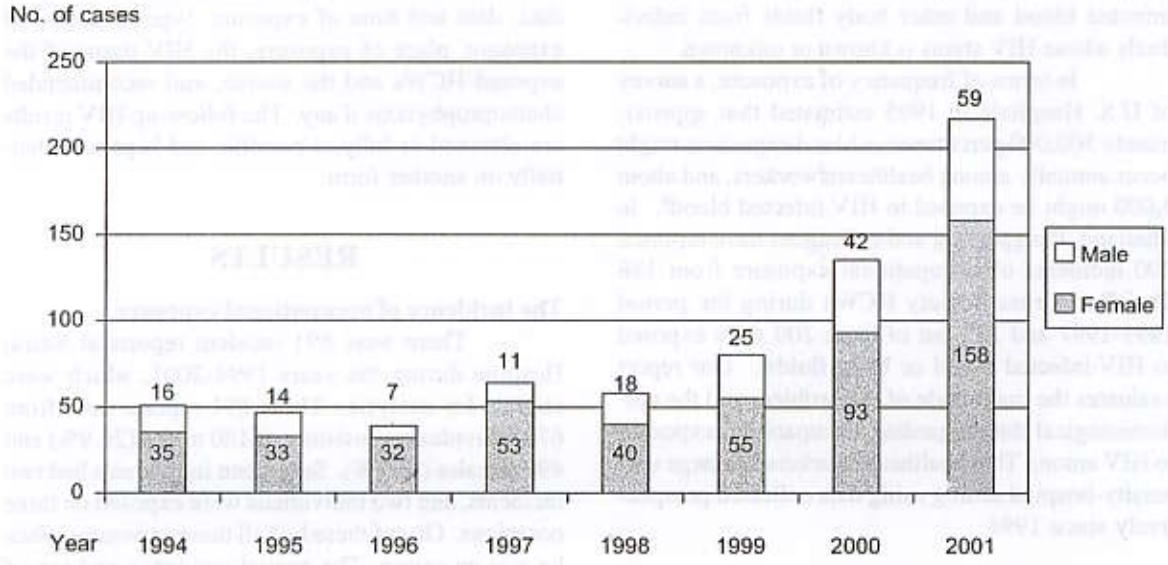


Figure 1. The annual incidence of occupational exposure and sex of healthcare workers in Siriraj Hospital 1994 - 2001.

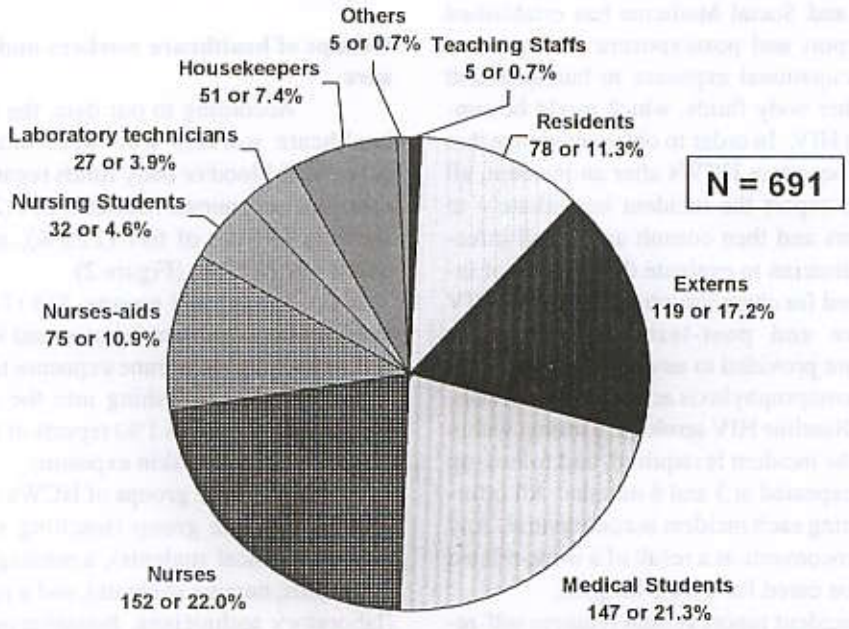


Figure 2. Groups of healthcare workers with occupational exposure.

jor type of exposure in all three groups. The proportion of cases with mucous membrane exposure was 2.2 and 5.3 times higher in the physician group than the nursing and paramedic group, respectively (19.2% VS 8.9% VS 3.6%).

There were 299 of 520 (57.5%) cases with needlestick or sharps injuries with data available concerning the area of injury (Table 1). 20.6% of the injuries were to the left index fingers and 12.9% to the left thumbs (% of all needlestick or sharps injuries). The injuries occurred on the left hand 1.6 times more frequently than the right hand.

Types of procedure leading to injury

In Figure 3, it is evident that venepuncture and surgical operations were the two highest risk procedures for injury (20.7% and 12.3%). There were three other procedures that accounted for approximately 10% of cases including suturing wounds, minor medical procedures, and assisting labour. Interestingly, among 65 HCWs who were injured while assisting labour, 51 (7.4% of all 690 cases) were medical students or externs who performed perineorrhaphy during their rotation on the obstetric wards. Injury during waste collection was another concern because it accounted for 47 (6.8%) cases and was predominantly from needlestick or sharps injuries from unknown sources.

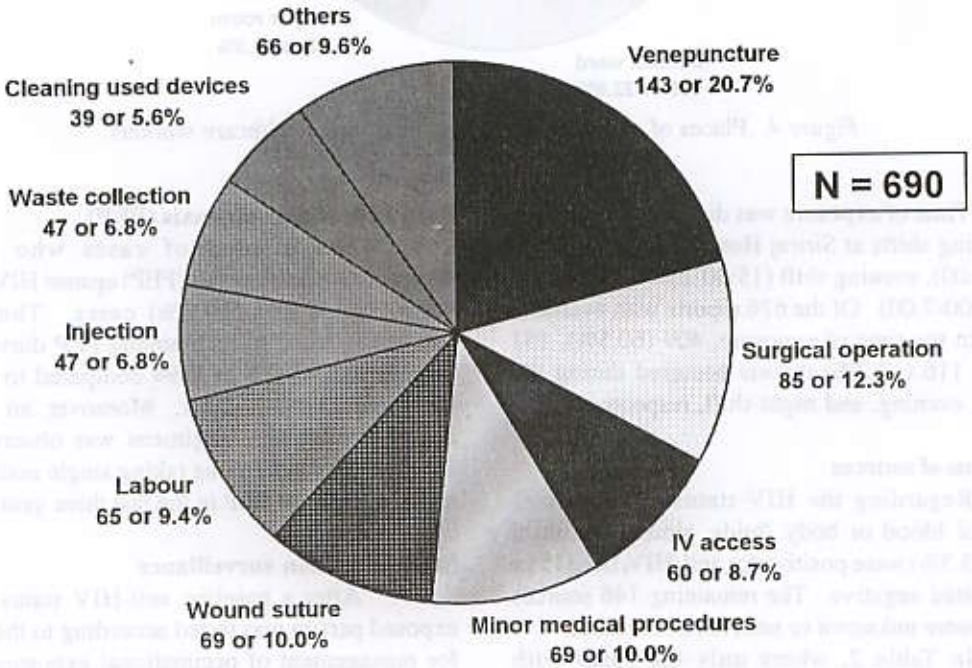


Figure 3. Types of procedure leading to injury.

Places and time of exposures

Places of occupational exposures are categorized in Figure 4. The highest incidence occurred on the medical wards (156 reports or 22.6%) followed by operating room (121 or 17.5%) and emergency room (111 or 16.1%). Interestingly, 34 (4.9%) were incident reports from medical students or externs who were on a community medicine rotation in other affiliated hospitals in central Thailand. After the incidents they consulted the local staff or called Siriraj staff for postexposure counseling and chemoprophylaxis. They submitted completed incident reports after they returned from their rotation.

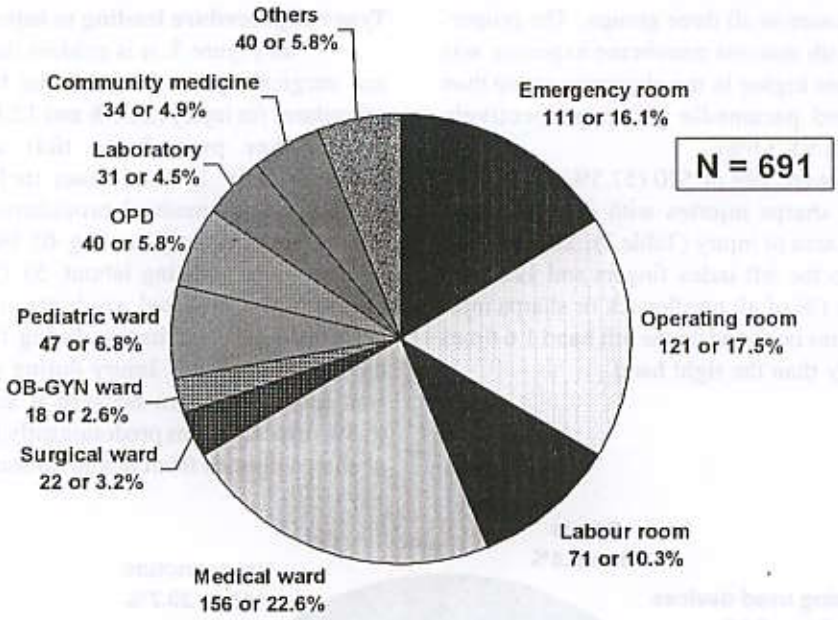


Figure 4. Places of occupational exposure among healthcare workers.

Time of exposure was divided according to the working shifts at Siriraj Hospital: morning shift (7:00-15:00), evening shift (15:00-23:00), and night shift (23:00-7:00). Of the 676 reports with available data about the time of exposure, 409 (60.5%), 151 (22.3%), 116 (17.2%) reports occurred during the morning, evening, and night shift, respectively.

HIV-status of sources

Regarding the HIV-status of those 691 sources of blood or body fluids, almost one third (230 or 33.3%) were positive for anti-HIV, but 315 or 45.6% tested negative. The remaining 146 sources (21.1%) were unknown or unable to be traced.

In Table 2, where only the cases with evidence of exposure to an HIV-positive source were analyzed, 134 out of 230 (25.8%) cases were exposed to HIV-infected blood with needlestick or sharps injuries which represents the exposure with the highest risk of HIV infection. There were 27 (5.2%) other high-risk exposures to mucous membrane and 16 (3.1%) cases of broken skin exposure to HIV-infected blood.

Postexposure prophylaxis (PEP)

The number of cases who received postexposure prophylaxis (PEP) against HIV infection were 206 of 691 (29.8%) cases. There was a decreasing trend to recommend PEP during this 8-year period, 49.0% in 1994 compared to 28.1% in 1997 and 23.0% in 2001. Moreover, an increased use of combination regimens was observed since 1997. There was no one taking single nucleoside or monotherapy for PEP in the last three years.

Seroconversion surveillance

After a baseline anti-HIV status of every exposed person was tested according to the protocol for management of occupational exposure, follow-up anti-HIV-status was encouraged at 3 and 6 months after the incident. There were 8 individuals who refused to be tested either for baseline or follow-up serology. By the time of this analysis took place, 629 cases were eligible for analysis. Only 172 (27.3%) cases reported back their anti-HIV-status at 6 months, which were all negative for anti-HIV. To date no one has claimed compensation for work-related acquisition of HIV. From this we presume that nobody seroconverted following occupational exposure.

Table 1. Area of injury of all needlestick injuries categorized into specific areas of the hand.

Area of injury	No.	%
Right hand	183	35.2
Right thumb	51	9.8
Right index	55	10.6
Right middle	30	5.8
Right ring	18	3.5
Right little	7	1.3
Right dorsal or palmar area	22	4.2
Left hand	299	57.5
Left thumb	67	12.9
Left index	107	20.6
Left middle	57	11
Left ring	25	4.8
Left little	14	2.7
Left dorsal or palmar area	29	5.6
Total hand area	482	92.7
Non hand area	38	7.3
Total	520	100

Table 2. Groups of healthcare workers exposed to HIV positive sources and types of occupational exposure.

Types of occupational exposure	Physician group No.	Nursing group No.	Paramedic group No.	Total No. (%)
Needle or sharp objects				
- Blood	65	60	9	134 (25.8%)
- Other body fluids	0	1	0	1 (0.2%)
Mucous membrane				
- Blood	18	8	1	27 (5.2%)
- Other body fluids	19	4	0	23 (4.4%)
Broken skin				
- Blood	6	9	1	16 (3.1%)
- Other body fluids	3	0	0	3 (0.6%)
Intact skin				
- Blood	8	13	1	22 (4.2%)
- Other body fluids	4	0	0	4 (0.8%)
Total	123	95	12	230 (100%)

DISCUSSION

Needlestick and sharps injuries occur frequently in HCWs but are underreported[1,11,12]. Many HCWs do not perceive the actual risk of acquiring HIV infection from different types of occupational exposures. This lack of knowledge contributes to underreporting of injuries. Our data show the huge increase in incident reports in the last two years while Siriraj Hospital was in the process of acquiring hospital accreditation (HA). The process alerted administrators and HCWs to occupational health issues. Thus, HCWs who encountered any accident, especially occupational exposure to blood-borne pathogens, were encouraged to report to the responsible authorities. The increase clearly demonstrates underreporting during previous years.

This report shows that nurses are more likely to experience occupational exposure than other groups of HCWs. Their works involve many procedures with patients: venepuncture, injection, intravenous access, etc. Medical students and externs are also at high risk because they are often relatively inexperienced. Their technical skills in daily clinical practice may not be well acquired, and thus they are more likely to be expose to blood and other body fluids.

According to the place of exposure, occupational exposure occurred on medical wards more frequently than any other place. It reflects the fact that there are more venepuncture and minor procedures on medical wards given the nature of patients in the internal medicine services. The data also show more injuries to the left hand, especially left index fingers and left thumbs. Recapping of the needles might be a major reason for injury. Most human beings are right-handed, so they are usually holding the needle cap with their left index finger and thumb when the injury occurs. The morning shift is the time period with the greatest number of incidents. This may due to the large number of procedures being done for the patients at this time.

There is a trend for PEP at Siriraj Hospital to be recommended less frequently. An important explanation for this might be because of the increase in incident reports of cases with low risk exposure in the last two years due to the effect of the hospital accreditation process mentioned above. However, there were more PEP combination regimens given to high risk exposed individuals as there are theoretically more effective than monotherapy[10]. Our follow-up rate at 6 months was only 27.3%, but nobody seroconverted. In the group lost to follow up, no one reported a work-related HIV infection or claimed for compensation at this point in time.

As far as we are concerned, this data is the second report of large-scale occupational exposure among Thai HCWs. The results demonstrate that nurses, medical students and externs are likely to experience work-related injuries while performing venepuncture, surgical operations, wound suture, etc. In addition, more injuries occur on medical wards during the morning shift and are more likely to occur on the non-dominant hand of injured HCWs. Most of the results are consistent with the previous report from Pungpapong' s group[9]. Thus, repeated training of universal precaution to prevent occupational exposure to HIV is essential among inexperienced nurses, medical students and externs. Protective devices such as gloves, gowns, goggles, and disposal boxes should be readily provided and used properly.

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