

Outbreak Investigation Express

The Epidemic of Enterovirus 71 in Taiwan, 2011-2012

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Abstract

The enterovirus 71 (EV71) epidemic did not abate in late 2011 but continued to occur in early 2012. Because of the absence of large-scale EV71 outbreaks in Taiwan after 2008, most children less than three years of age have not been immunized to EV71. Therefore, the high proportion of community specimens tested positive for EV71 increases the likelihood of a larger outbreak of EV71 to occur after March 2012. From July 1, 2011 to March 1, 2012, Taiwan Centers for Disease Control had confirmed 70 patients with severe enterovirus infections (3 deaths); all were confirmed as EV71 infections. The median age of the 70 patients was 2 years (range 3 months to 8 years); 49 (70%) were aged less than three years. Clinical presentations of the 70 patients included myoclonus with autonomic dysfunction (n=42), acute encephalomyelitis (n=33), respiratory failure (n=4), and cardiac failure (n=1). The median interval from initial symptom onset to the recognition of severe presentations was 3 days (range 0.5–16 days); in 54 (77%) patients the intervals were 3–7 days. Although EV71 infections are generally mild and most children recover, few of them may develop severe complications or death. Because EV71 continues to circulate in the community, health care providers should pay particular attentions to the “warning signs” indicative of severe complications, such as “lethargy, consciousness disturbance, poor activity and limb weakness”, “myoclonic jerk”, “recurrent vomiting”, and “tachypnea or tachycardia”. These patients should be referred to the designed hospitals for appropriate clinical management.

Original Article

Non-anonymous HIV screening in Taoyuan: HIV-positive rate, reason for screening, and risky sexual behavior

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Abstract

HIV screening has a very important role in controlling the epidemic of acquired immunodeficiency syndrome (AIDS). However, it is common for a diagnosis of HIV infection to be delayed. In Taiwan, people can choose to undergo anonymous testing, non-anonymous testing, or self-testing to find out their HIV status. The findings from anonymous HIV screening have been frequently reported. However, there has been no such report on non-anonymous HIV screening. We analyzed data from non-anonymous HIV screening and questionnaire surveys at participating medical institutions in Taoyuan in 2010 to estimate the HIV-positive rate, and to find out risky sexual behaviors, and the reasons why individuals underwent screening. We slightly modified the questionnaire used by the Taiwan Centers of Disease Control (CDC) for their free-of-charge, anonymous HIV screening and counseling. In 2010, 28 participating medical institutions in Taoyuan County offered non-anonymous HIV screening. A total of 6,097 individuals underwent screening, and 2 were HIV-positive. Hence, the HIV-positive rate was 33 per 100,000 (=2 per 6097). The 95% confidence interval was 9 to 118 per 100,000 and encompassed the HIV prevalence rate in Taiwan. Many screenees (25.0%-34.1%) did not indicate their reason for taking the test, and 66.1% had not been previously screened for HIV. The most common reason for taking the test was purchasing sex within the previous three months (3.0%), followed by occurrence of a one-night stand (1.5%). The HIV-positive rate in non-anonymous HIV screening was similar to the HIV prevalence rate in Taiwan. Individuals who underwent non-anonymous HIV screening were not in a high-risk group for HIV infection. Most did not indicate their reason for screening. We suggest that the questionnaire should be revised to determine screenees reasons for seeking testing, their knowledge of HIV/AIDS, and their satisfaction with AIDS counseling.

Keywords: Human immunodeficiency virus (HIV), non-anonymous screening, positive rate, reasons for screening

Introduction

Screening for HIV antibodies or antigens (HIV screening) has a very important role in controlling the epidemic of acquired immunodeficiency syndrome (AIDS) [1]. After infection is diagnosed and confirmed, HIV carriers can limit unsafe sexual behavior, thereby reducing the opportunity to transmit the virus to others. HIV reproduction and disease progression can be inhibited, and the quality of life and survival of HIV carriers can be increased after they receive high activity antiretroviral treatment [2]. In 2006, the United Nations (UN) reached a consensus and urged countries to offer nationwide and worldwide HIV screening [3].

The first case of HIV infection in Taiwan was reported in 1984. Since then, various active and passive screening tests and programs have been developed, including monitoring of vulnerable groups in 1984, comprehensive screening (HIV-1 Ab) of blood donors in 1988, screening of all draftees in 1989, screening of all inmates in 1990, screening of all new soldiers and foreign workers in 1991, screening of donated blood in 1995, anonymous HIV screening in 1997, pilot screening of pregnant women in 2000, screening of patients with sexually transmitted diseases (STDs) in 2003, screening of drug addicts in outpatient rehabilitation clinics, military retirees, and drug suspects in 2004, screening of all pregnant women in 2005, screening of drug addicts in methadone maintenance treatment (MMT) in 2006. In 2007, AIDS Prevention and Control Act was passed to bolster the requirements for consent and counseling [4].

Individuals who are concerned that they might be infected with HIV can be tested via three approaches:

(1) Anonymous screening: individuals are not required to register at a medical institution, provide any information, or complete relevant documents. However, they must make an appointment at a medical institution in advance to avoid crowding and attend a counseling before screening. After blood collection, the medical institution provides them with a number and a code. After approximately one week, they can call the medical institution, provide their number and code, and find out the result of the test.

(2) Non-anonymous screening: individuals register for screening with their national health card at a medical institution. They attend a counseling at an outpatient clinic. If the screening result is positive, they undergo a second-stage blood test. If a positive response is confirmed by a Western blot assay, they are admitted to the medical system to receive treatment.

(3) Self-screening: the concept of regular HIV self-screening is promoted by the Taiwan AIDS Foundation. The Abbott Determine HIV-1/2 rapid assay is used for screening: a small amount of blood is collected from the finger tip and a buffer solution is used for detection. The result is known in 15 minutes. Individuals must bear the expense of screening. A telephone counseling is provided before the rapid assay is delivered. The advantages are convenience and privacy. However, the result can be misinterpreted. If

the test result is positive, screenees are requested to go to a medical institution to undergo a confirmatory blood test [5].

Although there are many channels for HIV screening, delayed diagnosis of HIV infection is still common. In the United States, it was estimated that 21% of HIV carriers were not diagnosed in 2006 [6]. In Taiwan, it was estimated that the number of people aged 15-49 years who were actually infected with HIV was 2.4 times the reported number [7]. Another study indicated that diagnosis was delayed in 46% of people newly infected with HIV [8]. Another report showed that 10% of HIV carriers were concurrently patients with AIDS onset and that 20% of HIV carriers developed AIDS within one year after their infection was reported [4]. The cause for delayed detection may be that most Taiwanese have a negative attitude toward HIV screening. A poll conducted by the Department of Health in Taiwan showed that approximately 50%-60% of respondents had stigma toward AIDS [9]. Most Taiwanese do not accept patients with AIDS and push people with HIV to the margins of society. Therefore, people who wish to undergo screening might be afraid to do so. Although some people are aware that they are in a high-risk group, they are afraid of being stigmatized and thus refuse to undergo HIV screening [10], which is not conducive to AIDS control. Moreover, worries regarding invasion of privacy, loss of employment, medical inconvenience and expense, and side effects, can affect the willingness of members of high-risk groups to undergo HIV screening. Regardless of whether they fail to undergo early screening due to a fear of being stigmatized or lack of awareness, the delay in diagnosis decreases the opportunity for early treatment and increases unintentional transmission of the virus to others.

The rate of HIV screening in Taiwan should be increased. Screening rate refers to the number of people who undergo HIV screening divided by the total number of people. From 2004 to 2008, the average number of people in Taiwan aged 18 to 64 years who underwent screening was 2,504,455 per year, corresponding to the HIV screening rate of 16.2%. The screening rate among male and female Taiwanese was 20.0% and 12.3%, respectively. From 2005 to 2008, the average screening rate was highest (67.3%) at blood donation center, followed by military service-related health examinations (10.9%), screening of pregnant women (8.2%), and medical institution (3.8%) [4]. The HIV Infection Control and Patient Rights Protection Act, amended and promulgated on July 11, 2007 in Taiwan, added the provision that medical personnel cannot collect "blood for HIV testing with the screenees until they give their consent and receive counseling." [11] In the United States, the promotion of an informed consent system for HIV testing reduced the willingness of the general public to undergo HIV screening and decreased the screening rate [12]. It remains to be determined whether the newly amended provisions of the Taiwanese law will affect the HIV screening rate.

The HIV-positive rate at blood donation centers in the first half of the years 2008 and 2009 was 2.52 and 4.88 per 100,000, respectively [13]. The HIV-positive rate in

anonymous screening was 2.1%-8.6% [4, 14-16], which was much higher than the rate at blood donation centers. The results of questionnaires distributed at anonymous screenings in different hospitals showed that 20.4%-36.3% of respondents had had unsafe sex, a one-night stand, or *enjo kosai* (compensated dating), 13.5% had had male homosexual sex, and 37.1% were homosexual or bisexual [14-15, 17]. The high positive rate and results of the questionnaire survey indicated that screenees undergoing anonymous HIV screening were mostly individuals at high risk for HIV.

To our knowledge, there is no report on non-anonymous HIV screening in Taiwan. Since 2010, to increase the HIV screening rate, the Public Health Bureau of the Taoyuan County Government has issued official letters to medical institutions in Taoyuan County asking them to decide whether to participate in a project promoting free-or-charge, non-anonymous HIV screening. Screenees have been asked to complete a questionnaire since July 2010. In the present study, we analyzed data from these non-anonymous HIV screenings and questionnaire surveys conducted by the Public Health Bureau of Taoyuan County in 2010 to determine the HIV-positive rate and identify risky sexual behaviors and reasons for screening. The results should serve as a valuable reference for the Public Health Bureau to assist them in improving non-anonymous HIV screening and to help relevant organizations in other areas to promote non-anonymous HIV screening.

Materials and Methods

A. Study design and study screenees

We recruited all individuals who underwent non-anonymous HIV screening at the participating medical institutions (11 hospitals, 14 clinics, and 3 clinical laboratories) in Taoyuan in 2010.

B. Measurement

A questionnaire developed by the Taiwan Centers of Disease Control (CDC) for free-of-charge, anonymous HIV screening and counseling was slightly modified and distributed from July through December 2010. Information was collected on demographic characteristics, patterns of sexual behavior, condom use, and reasons for screening. The content of questionnaires was kept anonymous.

C. Statistical analysis

Data were entered into an Excel spreadsheet. The accuracy of the data was checked manually and by SAS software. SAS 9.1 software was used to perform the statistical analyses. Percentages were used for descriptive statistics, and the 95% confidence interval (CI) of the HIV-positive rate was calculated.

Results

Screening results (n=6097)

In 2010, 28 medical institutions joined the Public Health Bureau of Taoyuan County to

provide free non-anonymous HIV screening, and 6,097 people underwent screening. Most screenees sought testing at hospitals (4,925), followed by clinics (1,115) and clinical laboratories (57). Two screenees were HIV-positive, and the HIV-positive rate was 33 per 100,000 ($=2$ per 6097). The 95% CI was 9 to 118 per 100,000. The two HIV-positive individuals were detected at two hospitals: 3,091 (50.7%) people were screened at hospital A and 722 (11.8%) were screened at hospital B.

Questionnaire results (n=4054)

From July through December 2010, 4,054 questionnaires were collected. The most common age group was adults aged 31-40 years (29.3%), followed by age 21-30 (24.4%) and age 41-50 (21.9%). Most screenees were married (55.9%); 33.4% were single. As for level of education, most screenees were high school or vocational high school graduates (32.6%), followed by undergraduates (25.7%) and graduates of junior college (19.6%). Among screenees, 77.0% were full-time workers, 10.3% were unemployed, and 4.6% were students (Table 1).

Sexual experience and risk factors

As for sexual orientation, most screenees were heterosexual (90.8%); 2.4% had experienced anal sex, 20.9% had experienced oral sex, 13.4% always used a condom when having sex with their regular sex partner (including spouses and partners living together), 13.4% never used condoms, and 40.5% did not answer the question on condom use. Most screenees had no history of sexually transmitted diseases (90.6%) and had never used drugs (89.9%). Only 1.1% were sex workers. It is noted that high proportions of screenees (7.2%-40.5%) did not answer questions in this section (Table 2).

Reasons for screening

Among screenees, 66.1% had never undergone HIV screening before, and most did not indicate a reason for screening (25.0%-44.7%). The most common reason for screening was purchasing sex during the previous three months (3.0%), followed by occurrence of a one-night stand (1.5%) (Table 3).

Table 1. Demographics characteristics (n= 4054)

	Percentage		Percentage
Age (year)		Education	
11-20	3.5%	elementary school	6.8 %
21-30	24.4%	junior high school	9.0 %
31-40	29.3%	senior high / vocational	32.6 %
41-50	21.9%	junior college	19.6 %
51-60	13.3%	undergraduate +	25.7 %
≥ 61	6.2%	missing	6.3 %
missing	1.3%	Occupation	
Marital status		full-time job	77.0 %
married	55.9 %	part-time job	3.1 %
single	33.4 %	unemployed	10.3 %
divorce	3.8 %	missing	9.6 %
separate	0.3 %	Student	
widow/widower	0.8 %	no	20.1 %
missing	5.8 %	yes	4.6 %
		missing	75.3 %

Table 2. Sex experience and risk factors (n= 4054)

	Percentage		Percentage
Sexuality		Had Sexually transmitted disease	
heterosexual	90.8 %	no	90.6%
bisexual	1.0 %	yes	1.0%
homosexual	0.4 %	missing	8.4 %
missing	7.8 %	Ever use drugs	
Ever had anal sex		no	89.9 %
no	90.5 %	yes	1.0 %
yes	2.4 %	missing	9.1 %
missing	7.2 %	Sex workers	
Ever had oral sex		no	89.3 %
no	71.1 %	yes	1.1 %
yes	20.9 %	missing	9.6 %
missing	7.9 %		
Frequency of condom use when having sex with regular sex partner			
always	13.4 %		
most of the time	14.6 %		
sometimes	18.2 %		
never	13.4 %		
missing	40.5 %		

Table 3. Reasons for screening (n= 4054)

	Percentage		Percentage
Suspected spouse or sexual partner being infected with HIV		Trading Sex in last three months (n=123)	
no	73.9 %	men who have sex with men	0.8 %
yes	1.4 %	patronizing prostitutes	17.9 %
missing	24.8 %	sex trade in internet	4.1 %
Confirmed spouse or sexual partner being infected with HIV		other	32.5 %
no	74.4 %	missing	44.7 %
yes	0.6 %	One-night-stand	
missing	25.0 %	no	68.6 %
Suspected family member partner being infected with HIV		yes	1.5 %
no	74.5 %	missing	29.9 %
yes	0.6 %	Inject drug and share syringes	
missing	24.9 %	no	71.2 %
Spouse or sexual partner is an injecting drug user		yes	0.1 %
no	74.4 %	missing	28.7 %
yes	0.4 %	Needle punching	
missing	25.2 %	no	68.8 %
Suspected self being infected with STD		yes	1.1 %
no	73.8 %	missing	30.1 %
yes	1.1 %	Ever undergone HIV screening	
missing	25.1 %	no	66.1 %
purchased sex in last three months		yes	6.3 %
no	62.9 %	missing	27.6 %
yes	3.0 %		
missing	34.1 %		

Discussion

Since 2010, The Public Health Bureau of Taoyuan County Government has attempted to

increase the rate of HIV screening by cooperating with medical institutions in Taoyuan County in promoting free, non-anonymous HIV screening. We analyzed data from these screenings in 2010 and found that the HIV-positive rate was 33 per 100,000 (0.03%) and that screenees were not in high-risk groups for HIV infection.

Screening rate

We did not collect information on the number of people screened at each medical institution. Therefore, it was not possible to calculate the screening rate. Moreover, the results of the questionnaire survey showed that 66.1% of the screenees had not undergone HIV screening before. However, this percentage might be an overestimate, because monitoring of vulnerable groups (e.g., blood donors and draftees) was begun in 1984 [4]. Thus, some screenees might have forgotten or not known that they had undergone HIV screening and therefore replied that they had not undergone HIV screening. Chen and Yen (2005) found that self-perceived severity of AIDS was high among the general public, but that the self-perceived risk of HIV infection was low [18]. Chen et al. (2011) found that although grade 11 students at night school believed that AIDS was a serious disease, they felt that were unlikely to contract it [19]. It is reasonable to assume that the low self-perceived risk of infection among the general public is a cause of not taking HIV screening.

HIV-positive rate

The HIV-positive rate among the present screenees was 33 per 100,000 (0.03%), and the 95% CI was 9 to 118 per 100,000 (0.009%-0.118%). This is much lower than rates noted in anonymous HIV screening (2.1%-8.6%) [4, 14-16]. The 95% CI for the rate from non-anonymous HIV screening encompassed the 2010 HIV prevalence rate in Taiwan (74.0 per 100,000=17,122 prevalent HIV cases per 23,140,948 mid-year population) [20, 21], which suggests that it was similar to the HIV prevalence rate in Taiwan. The positive rate among screenees undergoing non-anonymous HIV testing was higher than that at blood donation centers (2.52 per 100,000 in 2008 and 4.88 per 100,000 in Jan-July 2009) [13]. Although blood donation centers should not be used as sites for HIV screening, some people still rely on donating blood to find out whether or not they are infected with HIV [22]. Because information on the HIV-positive rate in Taiwan was unavailable, the positive rate at blood donation centers can be used as a reference. Among the 28 medical institutions in this study, most screenees underwent HIV testing at hospitals, followed by clinics and clinical laboratories. The two HIV-positive individuals had been tested at 2 hospitals. It is thus advisable to strengthen promotion of AIDS prevention and control at hospitals, where most screenees underwent HIV screening and HIV-positive patients were detected.

Reasons for screening

In this study, the most common reason for screening was having purchased sex during the previous three months (3.0%), followed by occurrence of a one-night stand (1.5%), suspicion that a spouse or sex partner was an HIV carrier (1.4%), and confirmed infection of a spouse, sex partner, or family member (0.6%). Other studies reported that the main reason people

underwent anonymous HIV screening was suspicion that a spouse or sex partner was an HIV carrier (10.6%-54.3%), followed by occurrence of a one-night stand (41%-48%), having purchased sex during the previous three months (16.8%-36.6%), and occurrence of male homosexual behavior (12.9%)[3, 14-17]. Due to the low proportion of high risk behavior for HIV, low proportion of screening reasons, and the low HIV-positive rate for non-anonymous screening (0.03%), it is reasonable to conclude that individuals seeking non-anonymous screening were not members of high-risk groups for HIV.

Why did the respondents undergo HIV screening? Unfortunately, most respondents did not indicate their reason for screening, perhaps because they were required to include their name and ID number on the informed consent form for HIV screening, which might have made them unwilling to indicate a reason for screening. In future promotions of non-anonymous screening, it should be emphasized that the questionnaire will be kept anonymous and will not be linked to the test result. This might make screenees more willing to honestly reply to questions. In addition, we suspect that many participants in non-anonymous screening underwent testing because medical or nursing personnel promoted screening during a physical examination. However, the questionnaire did not include a checkbox to indicate this as a reason for screening. It is advisable to add a checkbox such as "I underwent HIV screening on the advice of medical personnel or because I learned about health education promotion activities at the medical institution" to identify the reason for screening.

Sexual behavior

Only 13.4% of the screenees always used condoms they had sex with their regular sex partner. This proportion was lower than that in anonymous screening (22%-25%) [3], perhaps because most of the present participants were heterosexual (90.8%) and only 0.4% were homosexual. There is a greater number of homosexual screenees undergoing anonymous HIV screening (27.8%-37.1%) [3, 17]. The homosexual population actively undergoes anonymous HIV screening and is more aware of HIV infection. Therefore, they use condoms more frequently than the heterosexual population. Moreover, some studies have shown that it is easier for people who have sex with casual sex partners to become infected with HIV or other sexually transmitted diseases [23, 24]. Therefore, a question concerning condom use during sex with casual sex partners should be included in future questionnaires.

Counseling

In addition to encouraging the general public to accept HIV screening, it is essential for medical and nursing personnel to provide screenees with counseling service during screening to help them learn about AIDS and further reduce risky behaviors [25]. The present questionnaire did not ask screenees about their need for AIDS counseling or their satisfaction. Future studies should investigate AIDS knowledge and how AIDS counseling services are implemented.

Cost benefit

The Public Health Bureau of Taoyuan County cooperated with medical institutions to

promote non-anonymous HIV screening for the general public. The results regarding the positive rate and reasons for screening showed that screenees undergoing non-anonymous HIV testing were mainly at low risk. It is important to determine whether implementation of non-anonymous HIV screening in the context of limited resources is economically effective. US studies showed that 6.7% of new infections could be prevented by implementing one comprehensive HIV screening for low-risk groups and annual HIV screening for high-risk groups, assuming such HIV screening could reduce sexual behavior by 20%. Even if sexual behavior is not reduced, expansion of HIV screening could prevent 3.7% of people from being infected [1]. The Public Health Bureau of Taoyuan County cooperated with medical institutions to provide an examination fee subsidy of NTD\$240 to every individual tested at participating medical institutions. In 2010, 6,097 screenees underwent HIV screening, which required a subsidy budget of NTD\$1,463,280(=NTD\$240/person × 6097 persons). Two HIV-positive patients were detected. On average, the drug expense for every patient with AIDS is NTD\$350,000. If HIV screening is not expanded, HIV carriers might continue to unintentionally transmit HIV to others. An increase in the number of HIV carriers will markedly increase medical expenditure [27].

Advantages and disadvantages of non-anonymous and anonymous HIV screening

The advantage of anonymous HIV screening is that no personal information needs to be disclosed. Therefore, screenees will be more willing to describe their sexual behavior and the reason for screening. However, follow-up of screenees is difficult for health authorities. The advantage of non-anonymous screening is that health authorities can observe and assist HIV-positive screenees and treat them. However, screenees are likely to be less willing to describe their sexual behavior and reason for screening.

The Public Health Bureau of Taoyuan County cooperated with medical institutions to promote non-anonymous HIV screening. Before the screening, individuals had to complete the informed consent form for screening and the questionnaire. To encourage them to complete the questionnaire honestly, medical or nursing personnel should emphasize that the questionnaire remains anonymous and do not be bound with the informed consent form. Therefore, although medical institutions are aware of the name and ID number of screenees, questionnaire responses remain anonymous.

Suggestions

Regarding the questionnaire, a checkbox for the reason for screening checkbox, such as “I underwent HIV screening on the advice of medical personnel or because I learned about health education promotion activities at medical institutions”, should be added. Condom use during sex with casual sex partners, AIDS knowledge, need for and satisfaction with AIDS counseling, should be investigated. When asking people to complete the questionnaire, the fact that name, ID number, and test result are not linked with the questionnaire should be emphasized so that the screenees are willing to answer questions fully and honestly.

Limitations

- (1) The results apply only to individuals undergoing non-anonymous HIV screening at participating medical institutions in Taoyuan and cannot be generalized to other regions.
- (2) The gender of screenees was not available in the data. Hence, gender differences could not be assessed.
- (3) The questionnaire did not investigate whether screenees had sexual experience.
- (4) The screening rate could not be calculated because information on the number of people served by each medical institution was not collected.
- (5) Because screenees from January through June 2010 did not complete the questionnaire, it was not possible to determine whether there was a difference between screenees whose questionnaires were and were not returned.

Conclusions

The Public Health Bureau of Taoyuan County cooperated with medical institutions to promote non-anonymous HIV screening for the general public. In 2010, 6,097 screenees underwent such screening, and 2 were found to be HIV-positive. The HIV-positive rate was 33 per 100,000 (=2 per 6097). The 95% CI for the rate was 9 to 118 per 100,000, and this interval encompassed the HIV prevalence rate in Taiwan (74.0 per 100,000). The most common reason for screening was purchase of sex during the previous three months (3.0%), followed by the occurrence of a one-night stand (1.5%). Non-anonymous screenees were mainly not members of high-risk groups for HIV/AIDS. However, most screenees did not indicate their reason for screening, which indicates that the questionnaire should be revised to allow collection of additional, and more accurate, information.

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