

ADVANTAGES OF THE RAPID HIV-1 TEST IN OCCUPATIONAL ACCIDENTS WITH POTENTIALLY CONTAMINATED MATERIAL AMONG HEALTH WORKERS

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SUMMARY

In occupational accidents involving health professionals handling potentially contaminated material, the decision to start or to continue prophylactic medication against infection by Human Immunodeficiency Virus (HIV) has been based on the ELISA test applied to a blood sample from the source patient. In order to rationalize the prophylactic use of antiretroviral agents, a rapid serologic diagnostic test of HIV infection was tested by the enzymatic immunoabsorption method (SUDS HIV 1+2, MUREX®) and compared to conventional ELISA (Abbott HIV-1/ HIV-2 3rd Generation plus EIA®). A total of 592 cases of occupational accidents were recorded at the University Hospital of Ribeirão Preto from July 1998 to April 1999. Of these, 109 were simultaneously evaluated by the rapid test and by ELISA HIV. The rapid test was positive in three cases and was confirmed by ELISA and in one the result was inconclusive and later found to be negative by ELISA. In the 106 accidents in which the rapid test was negative no prophylactic medication was instituted, with an estimated reduction in costs of US\$ 2,889.35. In addition to this advantage, the good correlation of the rapid test with ELISA, the shorter duration of stress and the absence of exposure of the health worker to the adverse effects of antiretroviral agents suggest the adoption of this test in Programs of Attention to Accidents with Potentially Contaminated Material.

KEYWORDS: Health care workers; Occupational exposures; Immunoabsorption test; ELISA; HIV-1; AIDS.

INTRODUCTION

Although the risk of acquiring an infectious agent by caring for a patient infected with any microbe (virus, bacteria and others parasites), or by contact with blood and body fluids is well known and has always existed, it was only after the discovery of Human Immunodeficiency Virus (HIV) as the causative agent of Acquired Immunodeficiency Syndrome (AIDS)¹, and the elucidation of its transmission⁹ that important efforts were made in order to reduce accidental exposure to blood. The risk of an occupational accident with potentially contaminated material (APCM) is a daily concern for health care workers (HCW) in hospitals, clinics and laboratories, especially those who manipulate blood and body fluids.

Ribeirão Preto is a city of half million people located in the Northeast of São Paulo state in Brazil. It has an AIDS incidence rate of 706.6 per 100,000 inhabitants and it is the fourth municipality with the largest number of AIDS cases in Brazil². The city has a University Hospital with 600 beds and a referral center for HIV/AIDS, serving also about 2,000,000 people living in the Northeast region (18 municipalities).

A special service dealing with Occupational Accidents with Health Workers was set up in the hospital in January 1997. Assistance to a victim of an occupational accident includes the use of a protocol that

allows the assessment of the circumstances of the accident, serologic tests for HIV, hepatitis B and C for the patient who was the source of the accident and for the HCW⁴, and treatment with prophylactic medication against HIV (Zidovudine, Lamivudine and/or Indinavir) and hepatitis B, when necessary.

The rapid HIV serologic test was introduced at the University Hospital of Ribeirão Preto in July 1998 in order to evaluate the patients who were the source of occupational accidents among HCW handling potentially contaminated material (APCM). The final aim of this procedure was to rationalize the use of prophylactic medication against HIV-1, and to assess the advantages of the enzyme immunoabsorption test (rapid anti-HIV test), compared to conventional laboratory testing by immunoenzymatic assay (ELISA).

MATERIAL AND METHOD

We surveyed the exams performed from July 1998 to April 1999 on patients who were the source of the accidents involving HCW at the University Hospital. The rapid anti-HIV test was performed using the enzyme immunoabsorption test (SUDS HIV 1+2 test, MUREX®), which is completed in approximately 15 minutes. All blood samples were later submitted to immunoenzymatic assay (ELISA) (Abbott HIV-1/ HIV-2 3rd Generation plus EIA®).

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RESULTS AND DISCUSSION

Rapid tests, by nature, employ short incubation times which could further compromise their performance. The use of a rapid test in a specific geographic area should be validated to ensure that the test is adequately sensitive to circulating HIV-1 types, because actual sensitivity and positive and negative predictive values may be affected by the relative distribution of various subtypes in a region^{5,6}. CONSTANTINE *et al.*⁵ reported successful identification of all HIV-1 group M subtype sera by seven rapid tests. A study by ENGELBRECHT *et al.*⁶ evaluated seven rapid tests and showed problems in detecting antibodies from patients infected with subtype C or D.

A total of 592 cases of APCM were notified from July 1998 to April 1999, 109 of which were evaluated with the rapid anti-HIV test by enzymatic immunoabsorption. The test was positive in only three cases, with confirmation by ELISA, and doubtful in one case, which was later found to be negative by ELISA (Table 1).

Table 1

Evaluation of HIV enzyme immunoabsorption test (rapid test) and immunoenzymatic assay (ELISA) among source patients of 109 health care workers involved in occupational accidents

		Positive	Rapid test Negative	Total
ELISA	Positive	3	0	3
	Negative	1*	105	106
	Total	4	105	109

* Doubtful

PHILLIPS *et al.*¹⁰, evaluated six rapid tests, showed for SUDS HIV 1+2 test a sensitivity of 100% and SUDS was positive for 5 of 69 confirmed seronegative individuals, resulting in a specificity of 93.24%. In other studies, rapid test showed a sensitivity of 100% and specificity of 98.9% to 99.5%^{7,8,11}. Based on these studies of sensitivity and specificity it is recommended that negative results be reported as definitive, but that positive results be confirmed with standard serology.

Prophylactic HIV therapy was not instituted in any of the cases in which the test was negative (106/109).

When the rapid anti-HIV test is not available, the victim of the occupational accident would take at least three days of medication because this is the average time needed to obtain the ELISA result. Depending on the result (negative or positive), prophylactic medication is discontinued or extended to 30 days.

The cost of three day prophylactic anti-retroviral agents is described below:

· Zidovudine with Lamivudine (2 pills per day) = 6 pills

Cost of 1 pill for the Brazilian government in American dollars = US\$ 1.98 (x 6 = US\$ 11.9)

· Indinavir 400 mg (6 pills per day) = 18 pills

Cost of 1 pill for the Brazilian government in American dollars (400 mg) = US\$ 1.16 (x 18 = US\$ 20.88)

Total = US\$ 11.90 + US\$ 20.88 = US\$ 32.78 per HCW.

Considering that 106 HCW had not received anti-viral prophylactic medication because the rapid anti-HIV of patients who are the source of occupational accidents was negative:

US\$ 11.90 x 106 = US\$ 1261.40

US\$ 20.88 x 106 = US\$ 2,213.28

Total US\$ 3,474.68 per 106 HCW.

Taking into account that the cost of 1 enzyme immunoabsorption test (SUDS HIV 1 + 2 test, MUREX[®]) is US\$ 5.37, the hospital spent US\$ 585.33 (106 x 5.37) instead of US\$ 3,474.68, and therefore, US\$ 2,889.35 were saved. In addition, patients did not need to experience the period of stress and exposure to undesirable side effects of antiretroviral agents.

CONCLUSION

The rapid HIV-1 test correlates well with ELISA, significantly reduces the expenses involved in the use of antiretroviral agents, and reduces the exposure to undesirable side effects. Furthermore, the use of the rapid test in cases of APCM reduces the period of stress among HCW who think they might be contaminated until they receive the final result obtained by ELISA. On this basis, we recommend the introduction of its use in Programs of Accidents with Potentially Contaminated Material, in agreement with the Brazilian Ministry of Health, that has recently adopted the procedure³.

RESUMO

Vantagens do teste rápido para HIV-1 em acidentes ocupacionais com material potencialmente contaminado em profissionais da saúde

Introdução : A partir de julho de 1998 foi introduzido, no Hospital Universitário de Ribeirão Preto, o teste rápido anti-HIV para avaliação do paciente fonte nos acidentes ocupacionais com material potencialmente contaminado (AMPC), em profissionais da saúde (PS), com posterior confirmação através do ensaio imunoenzimático (ELISA) (Abbott HIV-1/ HIV-2 3rd generation plus EIA).

Objetivo : avaliar as vantagens do teste de imunoabsorção enzimática (SUDS HIV 1 + 2 test, MUREX[®]) com intuito de racionalizar o uso de medicação profilática contra HIV-1.

Material e Métodos : Foram levantados os exames realizados no período de julho de 1998 a abril de 1999.

Resultados: Nesse período foram notificados 592 casos de AMPC, dos quais 109 foram avaliados com teste rápido anti-HIV através de imunoabsorção enzimática. Apenas em três casos o teste foi positivo, com confirmação pelo ELISA e em um o resultado foi duvidoso, sendo posteriormente negativo pelo ELISA. Não foi instituída, a terapia profilática para HIV, em nenhum dos casos em que o teste foi negativo (106/109).

Conclusão: O teste rápido para HIV-1 tem boa correlação com o ELISA, diminui os gastos com terapia anti-retroviral, diminui a exposição a efeitos colaterais indesejáveis e diminui o estresse do PS em se imaginar contaminado até o resultado final pelo ELISA. Por tudo isso sugere-se a implantação do seu uso nos Programas de Acidente com Material Potencialmente Contaminado.

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