

Percutaneous injuries and accidental blood exposure in surgical residents: Awareness and use of prophylaxis in relation to HIV

TO Nwankwo, UU Aniebue

Departments of Obstetrics and Gynaecology, University of Nigeria Teaching Hospital, Enugu, Nigeria

Abstract

Objective: To determine the occurrence of percutaneous injuries (PI) and accidental exposure to patients' blood (AEPB) in surgical residents in Enugu, Nigeria, their awareness of universal precautions (UP), and use of post-exposure prophylaxis (PEP).

Materials and Methods: Self-administered semi-structured pre-tested questionnaires were administered to 230 consenting trainee surgeons.

Results: The rate of exposure to PI/ABE was 67.5%. The number of exposures ranged from 1 to 5 with a mean of 1.9 ± 0.99 . Senior registrars had the highest rate of exposure (76.9%). In 89 exposures (63.6%) needle-prick injuries were reported. Adequate knowledge of the UP and PEP to HIV virus was only 41%. In most cases (72.1%) respondents subsequently disregarded the exposure.

Conclusion: The high rate of exposure to PI/ABE, inadequate knowledge and poor practice of UP/PEP seen in this study underscore the need for creating high level of awareness about UP/PEP, the development of clear institutional guideline and the provision of adequate materials and supervision to ensure adherence with the guideline. The practice of UP and PEP in PI and AEPB are life saving and should be emphasized in residency training.

Key words: Percutaneous injury, HIV, trainee surgeons

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Introduction

The global burden of HIV/AIDS has continued to be greatest in the sub-Saharan Africa. As at 2003, 70% of the estimated 37.8 million people with HIV and 70% of the 4.8 million new infections were from the region. The epidemic of the virus has been increasing in Nigeria since the first diagnosis of AIDS was made in the country in 1986 in a 13-year-old girl. The 2005 national HIV seroprevalence sentinel survey, however, showed reversal of this trend, which is probably due to various interventions by governmental and non-governmental organizations.^[1] The first occupational infection with HIV, was acquired from a patient who originated from sub-Saharan Africa.^[2]

In developed countries were basic precautionary measures are in place, transmission of HIV in the operating room is uncommon. Few centers in Nigeria have institutionalized strict reporting and follow-up for percutaneous injuries (PI) and there is paucity of information on HIV transmission in the work place in Nigeria. This has raised increasing concern among surgeons and those in training as to the safety of caring and operating on patients with HIV infection. This concern arises from the risk of transmission of virus through PI and other forms of accidental exposure to patient's blood (AEPB). An earlier study 13 years ago in a Nigerian hospital

Address for correspondence:

Dr. T. O. Nwankwo,
Department of Obstetrics and Gynaecology,
University of Nigeria Teaching Hospital, Enugu, Nigeria
E-mail: ogoonwankwo@yahoo.com

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documented a risk of 2 PCI/surgeon/year, 0.4 PCIs/medical/year and 0.6PCI/nurse/year.^[3] The occurrence of PI and other exposures to patients' blood may likely be higher in trainee surgeons whose skills are still limited.

Universal precautions (UP) have been advocated by Centre for Disease Control (CDC) USA as means to reduce occupational exposures to HIV virus.^[4] The aim of this study is to determine the occurrence of PI and AEPB in surgical resident and medical officers working in surgical units in Enugu, Nigeria and their awareness and use of UP and post-exposure prophylaxis (PEP).

Materials and Methods

Self-administered semi-structured pre-tested questionnaires were administered to all consenting trainee surgeons in the three hospitals that are involved in the training of surgeon in Enugu, South Eastern Nigeria. The hospitals were University of Nigeria Teaching Hospital (UNTH), Enugu State University Teaching Hospital and National Orthopaedic Hospital. UNTH and National Orthopaedic Hospital are Federal Government-funded institutions, while Enugu state University Teaching Hospital is funded by Enugu State Government. A written institutional guideline about UP and PEP was seen in only one of the hospitals.

The questionnaire had sections on the demographic information, the institution of training, level of specialization, occurrence of needle injury and percutaneous exposure to blood in last 6 months, and the frequency in last 1 year, the nature of the exposure to blood and the type of procedure being performed when the exposure or injury occurred. Exposure is regarded as contact between patient's blood and the care giver's mucous membranes or non-intact skin. AEPB is when exposure occurs following needle or instruments injury or splashing of blood during procedures. Respondents were also asked about needle manipulation, preventive measures (such as personal barrier method) used and how they managed the exposure or needle stick injury. The Likert's scale was used in structuring responses to questions in the questionnaire.

Knowledge of the doctors' personal HIV status was inquired as well as their awareness and knowledge of UP for prevention of HIV infection. A respondent was said to have adequate knowledge when he/she was able to tick correctly 50% of the measures (UP) recommended by CDC and 50% of the usual post-exposure prevention measures to HIV. The data was analyzed using a computer software program SPSS for windows version 11. Statistical analysis utilized the χ^2 test and statistical significant was considered present when the P-value was 0.05 or less.

Results

A total of 230 questionnaires were distributed to consecutive

consenting residents and 184 were properly filled and returned giving a response rate of 80%. Table 1 shows the sex, age, field of specialization and ranks of respondents. Male respondents were 81.5% and females 18.5%. Their age range was 22-40 years with a mean age of 31.8 +/- 5 years. The rate of exposure of respondents to PI/ABE in the previous 6 months was 67.5%. The annual rate of exposure ranged from 1 to 5 with a mean of 1.9 +/-0.99. Male respondents had an exposure rate of 70% and females 55.9% (P=0.10). Senior registrars had the highest rate of exposure (76.9%) followed by house officers (57.9%) (P=0.11). Respondents in orthopedic surgery (75%) and obstetrics and gynecology (70%) had the highest rate of exposure. Those in ophthalmology/accidents and emergency and ENT had the least rate of exposure and the differences were almost statistically significant (P=0.06).

The source of exposure to PI/ABE and the procedures being carried out at the time of exposure are shown in Table 2. In 89 exposures (63.6%), the respondents reported needle-prick injuries, 23.6% blood splashes and non-sharp instrument injuries while only 2.8% were injuries from surgical blades. Surgical operations (28.3%) were the commonest procedures being carried out at the time of exposure. Venopuncture was reported in 26.4% of cases, intravenous infusions in 20.7% and biopsy and aspiration in only 1.4% of cases.

Table 1: The demographic characteristics of the respondents and their frequency of exposure in the previous 6 months to percutaneous injury/accidental exposure to patients' blood

| Characteristics | Total | Number exposed (%) | P-value |
|-------------------------------------|-------|--------------------|---------|
| Sex | | | |
| Male | 150 | 106 (70.1) | 0.10 |
| Female | 34 | 19 (55.9) | |
| Age | | | |
| 20 -24 | 2 | 1 (50.0) | 0.94 |
| 25-29 | 62 | 42 (67.7) | |
| 30-34 | 62 | 44 (71.1) | |
| 35-39 | 39 | 26 (66.7) | |
| 40 and above | 19 | 12 (63.1) | |
| Field of specialization | | | |
| Orthopedic/Plastic surgery | 28 | 21 (75.0) | 0.06 |
| Obstetrics and gynecology | 77 | 54 (70.1) | |
| General surgery | 49 | 33 (67.3) | |
| Others | 30 | 17 (56.7) | |
| Rank/Level of specialization | | | |
| House officers | 80 | 56 (70.0) | 0.11 |
| Medical officers /registrars | 57 | 33 (57.9) | |
| Senior registrars | 47 | 36 (76.6) | |

The rate of exposure was 67.9%.

Table 2: The pattern of sources of Exposure in 140 exposures

| Characteristics | Frequency | % |
|-----------------------|-----------|------|
| Source of Exposure | | |
| Needle Prick | 89 | 63.6 |
| Non sharp exposure | 33 | 23.6 |
| Operating instrument | 14 | 10 |
| Surgical blade | 4 | 2.8 |
| Associated Procedure | | |
| Surgery operations | 41 | 28.3 |
| Venopuncture | 37 | 26.4 |
| Intravenous infusion | 29 | 20.7 |
| Wound suturing | 27 | 19.3 |
| Blood transfusion | 4 | 2.9 |
| Biopsy and aspiration | 2 | 1.4 |

Table 3 shows the respondents' knowledge of the UP and the PEP and the HIV status of self and patient at the time of exposure. Awareness of the UP and PEP to HIV viruses was claimed by 93.55 of the respondents. Of these, 41% had adequate knowledge, 51.6% had inadequate knowledge and 6.5% had no knowledge. One hundred and thirty (70.7%) respondents were aware of their HIV status at the time of exposure and 38.6% of them knew the patients HIV status. Of these, 26 (14.1%) patients were positive of HIV.

Table 4 shows the comparison of the level of knowledge of UP/PEP in the area of specialization and rank. Twenty-four (49%) respondents specializing in general surgery had adequate knowledge, 13 (46.4%) respondents in orthopedic/plastic surgery and 29 (37.7%) respondents in obstetrics and gynecology were also found to have adequate knowledge of UP/PEP. Doctors in ENT, ophthalmology and accidents and emergency departments had the least number with adequate knowledge of UP/PEP and 51.1% of the senior registrars had adequate knowledge while only 35.0% of house officer had adequate knowledge. The differences in both the area of specialization and rank were not statistically significant (P -value = 0.12 and 0.20).

Table 5 shows the post-exposure practices of the respondents surveyed. Their commonest method of first aid was to wash with water and clean with spirit (53.6%). Only 6.4% of them cleaned with hypochlorite solution at the time of exposure and 72.1% of the respondents subsequently disregarded the exposure. Two (1.4%) respondents commenced ART following exposure to PI in patients confirmed to be HIV positive.

Discussion

PI/AEPB remain risk factors for transmission of blood-borne pathogens such as HIV virus to the health workers especially those in training. The result of our study showed that 67.5

Table 3: Knowledge of universal precaution and post exposure prophylaxis, HIV status of self and that of the patient when PI/BE occurred in 184 respondents

| Characteristics | Number | Percent |
|------------------------------------|--------|---------|
| Knowledge of UP/PEP | | |
| Yes | 172 | 93.5 |
| No | 12 | 6.7 |
| Knowledge of hospital protocol | | |
| Yes | 85 | 46.2 |
| No | 99 | 53.8 |
| Level of knowledge of UP/PEP | | |
| Adequate | 77 | 41.9 |
| Inadequate | 95 | 51.6 |
| No knowledge | 12 | 6.5 |
| Knowledge of HIV status of self | | |
| Yes | 130 | 70.7 |
| No | 54 | 29.3 |
| Knowledge of HIV status of patient | | |
| Yes | 71 | 38.6 |
| No | 65 | 35.5 |
| No response | 48 | 26.1 |

% of resident doctors in Enugu, Eastern Nigeria had at least one PI/AEPB in the previous 6 months. The mean annual exposure was $1.9 \pm .99$. The rate of exposure to PI/AEPB in this study is an improvement on 88% and 81% exposure rate reported in similar earlier studies in Nigeria.^[5-7] The rate is, however, much higher than results in some other studies from Africa and other developing countries.^[8-10]

Needle prick has been reported by some studies as the commonest cause of PI/ABE.^[5,8,11] This was corroborated by this study in which 63.6% of PI/ABE was due to needle prick. Surgical operation was the commonest procedure during which exposure occurred in this study. This agrees with the finding of Lowenfel *et al.*^[12] who surveyed PI/ABE in surgeons and contrasts the finding in studies involving other health workers in which intravenous punctures, intramuscular injections and infusions were the most common procedures.^[10,11] The Epinetac project study showed that obstetrics and gynecological procedures have the highest risk of exposure.^[13] Residents from the department of orthopedic surgery followed by those from obstetrics and gynecology reported the highest percentage of PI/ABE in this study. Senior registrars were the most commonly exposed but this is in contrast to a previous study in South Africa in which registrars were the commonest group at risk.^[14]

There was a high level of general awareness (93.5%) of UP and PEP in the trainee surgeons in Enugu. This was comparable to the finding in a similar study among other health professionals and an improvement on 44% awareness of CDC guideline for UP in a previous study 5 years ago in Nigeria.^[5,15] The depth of knowledge, however, remained almost the same as in the last study. Trainee surgeons run

Table 4: Comparison of level of knowledge of UP/PEP with area of specialization/rank of respondents

| Characteristic | Level of knowledge | | P value |
|------------------------------------|--------------------|-------------------|---------|
| | Adequate (%) | No/inadequate (%) | |
| Area of specialization | | | |
| General surgery (n = 49) | 24 (49.0) | 25 (51.0) | 0.12 |
| Orthopaedic/Plastic surgery (n=28) | 13 (46.4) | 15 (53.6) | |
| Obstetrics and Gynaecology (n=77) | 29 (37.7) | 48 (62.3) | |
| Others. (n = 30) | 7 (23.3) | 23 (77.7) | |
| Rank | | | |
| House officer (n = 80) | 28 (35.0) | 52 (65) | 0.20 |
| Registrars/Medical officers (n=57) | 22 (38.6) | 35 (61.4) | |
| Senior Registrars (n = 47) | 24 (51.1) | 23 (48.9) | |

(%): Percentage of respondents from the area of specialization or rank, n = Number of respondents in each rank or specialization.

Table 5: The practice of post-exposure first aids and prophylaxis by exposed respondents

| Characteristic | Frequency | Percentage |
|---|-----------|------------|
| First aids | | |
| Washed with water and cleaned with spirit | 75 | 53.6 |
| Washed with water only | 32 | 22.9 |
| Cleaned with spirit only | 19 | 13.6 |
| Cleaned with hypochlorite solution | 9 | 6.4 |
| Did nothing | 5 | 3.6 |
| Subsequent action | | |
| Disregarded it | 101 | 72.1 |
| Had self-HIV status determined | 21 | 15.0 |
| Consulted a doctor | 9 | 6.4 |
| Reported to hospital management | 4 | 2.9 |
| Commenced ART | 2 | 1.4 |
| Had hepatitis B immunoglobulin | 2 | 1.4 |
| Had tetanus toxoid injection | 1 | 0.7 |

risk of contacting HIV infection through PI/ABE and inadequate knowledge and practice of UP/PEP increases their vulnerability. Only about half of the respondents who had PI/ABE knew the HIV status of their patients and 14.1% of these patients were HIV positive. Although definitive studies are limited PEP has been demonstrated in animal and human studies on HIV to reduced the transmission after the occurrence of occupational exposure.^[16,17] This study recorded a very poor practice of PEP by the resident doctors as respondents disregarded the situation in 72.2% of cases.

Inadequate knowledge and poor practice of UP/PEP underscore the need for creating high level of awareness about UP/PEP, the development of clear institutional guideline and the provision of adequate materials and supervision to ensure adherence with the guideline. The use of proper barriers such as foot wears, gloves, masks, goggles and aprons should be made mandatory for doctors in all health delivery centers. Effective training on UP/PEP is life saving and should be emphasized in residency training especially in a resource poor setting.

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