Practice of Universal Precautions among Healthcare Workers

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Introduction: Healthcare workers (HCWs) are exposed to bloodborne infections by pathogens, such as HIV, and hepatitis B and C viruses, as they perform their clinical activities in the hospital. Compliance with universal precautions has been shown to reduce the risk of exposure to blood and body fluids. This study was aimed at assessing the observance of universal precautions by HCWs in Abeokuta, Ogun State, Nigeria.

Subjects and Methods: The study was conducted in September 2003 in Abeokuta metropolis, Ogun State, Nigeria. The respondents were doctors, trained and auxiliary nurses, laboratory scientists and domestic staff. They were selected through a multistage sampling technique from public and private healthcare facilities within the metropolis. The instrument was an interviewer-administered, semistructured questionnaire that assessed the practice of recapping and disposal of used needles, use of barrier equipment, handwashing and screening of transfused blood.

Results: There were 433 respondents, 211 (48.7%) of which were trained nurses. About a third of all respondents always recapped used needles. Compliance with nonrecapping of used needles was highest among trained nurses and worst with doctors. Less than two-thirds of respondents (63.8%) always used personal protective equipment, and more than half of all respondents (56.5%) had never worn goggles during deliveries and at surgeries. The provision of sharps containers and screening of transfused blood by the institutions studied was uniformly high. A high percentage (94.6%) of HCWs observed handwashing after handling patients. The use of barrier equipment was variable in the institutions studied.

Conclusion: Recapping of used needles is prevalent in the health facilities studied. Noncompliance with universal precautions place Nigerian HCWs at significant health risks. Training programs and other relevant measures should be put in place to promote the appropriate use of protective barrier equipment by HCWs at all times.

Keywords: precautions ■ healthcare ■ healthcare workers

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INTRODUCTION

Healthcare workers (HCWs) are at risk of occupational hazards as they perform their clinical activities in the hospital. They are exposed to bloodborne infections by pathogens, such as HIV, hepatitis B and hepatitis C, from sharps injuries and contacts with deep body fluids.[1-3] In an era of HIV epidemic in sub-Saharan Africa,[4] this occupational risk is real and significant. Developing countries that account for the highest prevalence of HIV-infected patients in the world also record the highest needlestick injuries.[5] Needlestick injuries were the commonest occupational health hazard reported from a Nigerian teaching hospital.[6] The World Health Organization (WHO) estimates that about 2.5% of HIV cases among HCWs and 40% of hepatitis B and C cases among HCWs worldwide are the result of these exposures.[7]

The health consequences of hepatitis-C infection are enormous; symptoms of hepatitis-C virus (HCV) infection may not manifest until 20–30 years after viral transmission.[8] Also, as many as 60–85% of those infected with HCV develop chronic liver infection and are at risk for cirrhosis and liver cancer,[9,10] the risk of seroconversion following a needlestick injury from an HCV-antigen-positive patient is estimated to be 1.2 to 10%.[11] There is no immunization for HIV and hepatitis C. It becomes important to prevent infection by preventing exposure.

Since identification of patients infected with bloodborne pathogens cannot be reliably made by medical history and physical examination, universal precautions were recommended by the Centers for Disease Control (CDC) to be used on all patients.[12,13]

Universal precautions are simple infection prevention control measures that reduce the risk of transmission of bloodborne pathogens through exposure to blood and body fluids among patients and HCWs. Compliance with these universal precautions has been shown to reduce the risk of exposure to blood and body fluids.[14] The term "standard precautions" is replacing "universal precautions," as it expands the coverage of universal precautions by recognizing that any body fluid may contain contagious and harmful microorganisms.[15]

The level of practice of universal precautions by HCWs may differ from one type of HCW to another. The differences in knowledge of universal precautions by HCWs may be influenced by their varying type of training.[14,16] The absence of an enabling environment in the health institution, such as a lack of constant running water or a shortage of personal protective equipment (PPE), would lead to poor compliance with universal precautions. It, therefore, becomes important to assess the level of compliance with universal precautions by the various types of HCWs (doctors, trained nurses, auxiliary nurses, laboratory scientists and domestic staff) who make direct contact with patients, and level of compliance by HCWs in the various types of health facilities.

The compliance with universal precautions among HCWs in Abeokuta, Nigeria has not been assessed before. This study is aimed at assessing the observation of universal precautions among types of HCWs in the course of their duties at Abeokuta, Ogun State, Nigeria.

SUBJECTS AND METHODS

The study was conducted in September 2003 in the Abeokuta north and south local government areas (LGAs) of Ogun State, Nigeria. The LGA is an area within a state administered by the third tier of government. The respondents belonged to five types of HCWs (doctors, trained nurse, auxiliary nurses, laboratory scientists and domestic staff) who had direct contact with patients. The trained nurses undergo a more intensive training (in terms of content and skills acquisition) than the auxiliary nurses. The respondents were selected through a multistage sampling technique.

Healthcare services within Abeokuta are provided by the public sector at 32 primary healthcare clinics, six secondary-level health institutions and two tertiary-level health institutions. The tertiary-level care institutions offer more specialist care, are better equipped and receive referrers from secondary-level centers. Within the private sector, 52 clinics/hospitals and 10 medical laboratories registered with the Ministry of Health are also involved in healthcare delivery services in Abeokuta.

The list of registered private and public hospitals, maternity homes and medical laboratories in both LGAs was obtained from the Ogun State Ministry of Health. In each LGA, at least one-quarter of all registered institutions in each category of healthcare level was systematically selected with each institution having equal probability of being selected. In any category with less than four institutions, all were selected.

The list of names of all HCWs according to their types in the selected institution was obtained from the administrative authority. From the list of each HCW type, a random selection of at least one-quarter of the personnel was done. Where a selected individual was unavailable or declined to participate in the study, the next personnel on the list was chosen.

The instrument was an interviewer-administered, semistructured questionnaire, which sought to assess the practice of universal precaution. The biodata, professional status of the respondents, name and type of health institution were documented. The questionnaire contained questions on practice of recapping and disposal of used needles, use of barrier equip-

Table 1. Recapping of used needles by respondents according to types of HCW and facility

Number and Percent of Various Types of HCWs

Response to Recapping	Doctors	Trained Nurses	Auxiliary Nurses	Other HCWs	Total Number Responses	(χ^2) P Value
Never	13 (28.3)	121 (58.2)	33 (41.3)	48 (52.17)	215 (50.5)	
Always	19 (41.3)	65 (31.2)	28 (35.0)	34 (36.96)	146 (34.3)	(24.64)
Occasionally	14 (30.4)	22 (10.6)	19 (23.7)	10 (10.87)	65 (15.2)	P=0.0004
Total	46 (100.0)	208 (100.0)	80 (100.0)	72 (100.0)	426 (100.0)	

Number and Percent of Respondents from Various Facilities

Response to Recapping	Private Hospitals	General Hospital	Tertiary Hospital	Other Facilities	Total Number Responses	(χ^2) P Value
Never	91 (50.3)	60 (55.1)	48 (47.1)	26 (76.4)	225 (52.8)	
Always	54 (29.8)	43 (39.4)	35 (34.3)	4 (11.8)	136 (31.9)	(21.63)
Occasionally	36 (19.9)	6 (05.5)	19 (18.6)	4 (11.8)	61 (15.3)	P=0.0014
Total	181 (100.0)	109 (100.0)	102 (100.0)	34 (100.0)	426 (100.0)	

ment such as gowns, aprons and eye goggles during delivery and surgery, handwashing after handling patients and screening of blood before transfusion.

Three research assistants administered the questionnaires to the selected HCWs. They were trained on how to administer the questionnaire and educated on universal precautions to enable them to understand the respondents' answers. Before they commenced data collection, the research assistants were evaluated on the efficiency and consistency of responses. They were university graduates in science-related disciplines with previous research experience.

They were also retrained once during data collection to ensure consistency of responses. Prior to commencement of data collection, the questionnaire was pretested at all levels of sampling and necessary modifications made.

It took about 15 minutes to complete each questionnaire. Before administration of the questionnaire, the purpose of the study was explained to each respondent and confidentiality of the information assured.

The Ethical Review Committee of the Federal Medical Centre, Abeokuta, gave approval for this study. Permission was obtained from the authorities of the selected institutions and verbal consent obtained from the respondents.

Data from the questionnaire were coded and entered into a microcomputer and analysis done using Epi Info™ 6.1 software. The Chi-squared test was used to test association between proportions.

RESULTS

There were 433 respondents in the study. There were 100 (23.3%) male and 333 (76.7%) female respondents. The majority of the respondents were trained nurses [211 (48.7%)], auxiliary nurses [81 (18.7%)], doctors [48 (11.1%)] and others [93 (21.5%)]. Others included laboratory scientists and domestic staff. There were 185 (42.7%) respondents from private hospitals, 110 (25.4%) from the general hospital, 105 (24.3%) from the tertiary center and 33 (7.6%) from other facilities. These included laboratories, maternity homes and primary health centers.

Almost a third of all respondents (31.9%) admitted to always recapping used needles. The proportion of HCWs who never recapped used needles was highest in medical laboratories/maternity homes (76.4%) and least in tertiary hospitals, 47.1% (Table 1). Compliance with nonrecapping of used needles was highest among trained nurses [121 (58.2%)] and worst with doctors [13 (28.3%)] (Table 1). An average of 73.9% of respondents stated that their institutions always provided sharps containers. There was no significant difference between health facilities in the provision of sharps containers, χ^2=7.31, p=0.29.

A high proportion (94.6%) of the HCWs always washed their hands after handling patients. There were no significant differences between HCWs from different facilities, χ^2 =0.78, p=0.85. Over half of the respondents (63.8%) always wore gloves, aprons and gowns during surgeries and deliveries. Almost one-fifth (16.5%) of respondents never complied. The number of respondents who always complied were significantly higher than the sum of those who did occasionally and those that never complied, p= 0.004 (Table 2). However, less than a fifth (16.3%) of respondents always wore protective glasses, and 56.5% never wore them during the procedures, p=0.0001 (Table 2).

The practice of screening blood before transfusion was high in all facilities studied; 94.6% of the respondents stated that blood for transfusion is always screened. There is no significant difference in this practice among the different types of facilities.

DISCUSSION

The practice of recapping needles has been identi-

Table 2. Use of gloves, aprons, gowns and use of protective glasses during surgery and deliveries

Number and Percent of Respondents Who Use Gloves, Aprons and Gowns

Type of Response	Private Hospital	General Hospital	Tertiary Hospital	Other Facilities	Total Number Responses	(χ^2) P Value
Never	33 (18.6)	16 (15.1)	11 (11.7)	8 (23.5)	68 (16.5)	
Always	120 (67.8)	65 (61.3)	53 (56.4)	24 (70.6)	262 (63.8)	(56.41)
Occasionally	24 (13.6)	25 (23.6)	30 (31.9)	2 (05.9)	81 (19.7)	P=0.0001
Total	177 (100.0)	106 (100.0)	94 (100.0)	34 (100.0)	411 (100.0)	

Number and Percent of Respondents Who Wear Glasses

Type of Response	Private Hospital	General Hospital	Tertiary Hospital	Other Facilities	Total Number Responses	(χ^2) P Value
Never	103 (57.2)	75 (71.4)	34 (36.6)	21 (61.8)	233 (56.5)	
Always	33 (18.3)	8 (07.6)	19 (20.4)	7 (20.6)	67 (16.3)	(29.25)
Occasionally	44 (24.5)	22 (21.0)	40 (43.0)	6 (17.6)	112 (27.2)	P=0.0001
Total	180 (100.0)	105 (100.0)	93 (100.0)	34 (100.0)	412 (100.0)	

fied as a contributor to incidence of needlestick injuries among HCWs.[3,17] In the present study, compliance with nonrecapping of used needles among the different types of HCWs was variable. Trained nurses were more compliant than auxiliary nurses, perhaps because they were more well trained. The doctors were more likely to recap used needles than the nurses or laboratory scientists. The lower frequency of use of needles among doctors compared to nurses and laboratory scientists may have led to their poor observance of this precaution. Doctors have been reported to consistently deemphasize the importance of and are poorly compliant with universal precautions. They are more likely to admit that they resheath used needles manually than nurses,[18] as shown in the present study.

Provision of sharps containers for proper disposal of needles and sharps was uniformly high in the various facilities; the differences were not statistically significant. This demonstrates an effort to prevent needlestick injuries by the authorities of the healthcare facilities. The improper disposal of used sharps and needles is known to cause needlestick injuries.[19] The authorities of the healthcare facilities studied also showed a high compliance with universal precaution in the screening of blood for HIV before transfusion.

The compliance with the use of PPE or barrier equipment during procedures with potential exposure to blood and other body fluids such as surgery and deliveries seemed to depend on the type of PPE and type of healthcare facilities. Less than two-thirds of all respondents claimed they always used PPE, such as aprons, gowns and gloves, during surgeries and while conducting deliveries. The use of goggles was particularly poor—less than one-fifth always used goggles under circumstances that promoted contact with body fluids. Protective glasses were more likely to be worn in the tertiary center and least likely in the general hospitals and primary healthcare centers. The tertiary center, perhaps being more sophisticated, provided protective glasses for the HCWs.

The observance of handwashing by the HCWs after handling patients, a routine infection control measure, was high in several facilities. This simple procedure that requires running water would have been easy to observe—besides, it also attends to personal hygiene.

This study was limited by the self-report method of assessment of practice of universal precautions, because the level of compliance might have been more properly assessed by observation. The likely tendency for the HCWs to exaggerate their compliance with universal precautions may have produced a less unfavorable picture than it actually is. From this study, however, the practice of universal precautions in a setting with a rising population of HIV-infected individuals is suboptimal.

RECOMMENDATIONS

The practice of recapping used needles should be prohibited in the healthcare facilities in line with the Occupational Safety and Health Administration (OSHA) guidelines.[20] Posters should be posted in the facilities to remind HCWs of the need to comply with universal precautions. All HCWs should be vaccinated against hepatitis-B virus to reduce the risk of hepatitis-B blood infection.

A written plan of the use of PPE should be posted in the hospital, especially at the delivery and surgical suites. The PPEs should be made available by the authorities of the health facilities.

All health facilities should establish a postexposure prophylaxis program for the protection of HCWs who experience needlestick injuries.

Above all, HCWs should receive periodic training on universal precautions, with a view to improving overall safety of patients and healthcare providers.

REFERENCES

1. Gerbending JL. Incidence and prevalence of human immunodeficiency virus, hepatitis B virus, hepatitis C virus and cytomegalovirus amongst health care personnel at risk of blood exposure: final report from a longitudinal study. *J infect Dis.* 1994;170:1410-1517.

2. Ramos- Gomez F, Ellison J, Greenspan D, et al. Accidental exposure to blood and body fluids amongst health care workers in dental teaching clinics; a prospective study. *J Am Dental Assoc.* 1997;128:1253-1261.

3. Reuben FL, Norden CW, Rockwell K, et al. Epidemiology of accidental needle puncture wounds in hospital workers. *Am J Med Sci.* 1983;286:26-30.

4. AIDS epidemic update: December 2003. Geneva, Joint United Nations programme on HIV/ AIDS and world Health Organization UNAIDS/03.39E.

5. Pruss-Ustun A, Rapiti E, Hutin Y. Sharps injuries: global burden of disease from sharps injuries to health-care workers. Geneva, Switzerland. World Health Organization, 2003. www.who.int/peh/burden/9241562463/sharp toc.htm.

6. Orji EO, Fasubaa OB, Onwudiegwu U, et al. Occupational health hazards among health care workers in an Obstetric and Gynaecological unit of a Nigerian Teaching hospital. *J Obstet Gynaecol.* 2002;22:75-78.

7. World Health Organization. The world health report 2002: reducing risks, promoting health life. World Health Organization, Geneva.

8. Wilburn SQ. Needlestick and sharps injury prevention. *Online J Issues Nurs.* 2004;9(3), manuscript 4. www.nursingworld.org/ojin/topic25/tpc25_4.htm.

9. Wodek A. Hepatitis C. Waiting for the Grim Reaper. *Med J Austral.* 1997; 166:284-285.

10. Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus. *MMWR.* 1998;47(RR-19):1-39.

11. Mizuno Y, Suzuki K, Mori M, et al. Study of needlestick accidents and hepatitis C virus infection in health care workers by molecular evolutionary analysis. *J Hosp Inf.* 1997;35:149-154.

12. CDC. Recommendations for preventing transmission of infection with human T-lymphotropic virus type III/Lymphadenopathy associated virus in the workplace. *MMWR.* 1985;34:681-686.

13. CDC. Recommendation for preventing transmission of infection human T-lymphotropic virus type III/lymphadenopathy associated virus during invasive procedure. *MMWR.* 1986;35:221-223.

14. Chan R, Molassiotis A, Chan E, et al. Nurse knowledge of and compliance with universal precaution in an acute care hospital. *Int J Nurs Stud.* 2002;39:157-163.

15. Sridhar MR, Boopathi S, Lodha R, et al. Standard precautions and post exposure prophylaxis for preventing infection. *Indian J Paediatr.* 2004;71: 617-626.

16. Ofili AN, Asuzu MC, Okojie OH. Knowledge and practice of universal

precaution amongst nurses in Central Hospital, Benin City, Edo State, Nigeria. *Niger Postgrad Med J.* 2003;10:26-31.

17. McCormick RD, Maki DG. Epidemiology of needle-stick injuries in hospital personnel. *Am J Med.* 1981;70:928-932.

18. Stein DD, Makarawo TP, Ahmad MF. A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham teaching hospitals. *J Hosp Infect.* 2003;54:68-73.

19. NIOSH Alert: Preventing needle-stick injuries in health care setting. NIOSH 1999 Publication No. 2000-108.

20. U.S. Department of Labor, Occupational Safety and Health Administration. Federal Register: Occupational exposure to blood borne pathogens. Final rule. 29 CFR Part 1910.1030. *Federal Register.* 1991;56:235. ■