

Standard Precautions Practice among Health Care Workers in Public Health Facilities of Mekelle Special Zone, Northern Ethiopia

Azeb Gebresilassie^{1*}, Abera Kumei² and Dejen Yemane¹

¹Department of Public Health, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

²School of Public Health, Faculty of Medicine, Addis Ababa University, Addis Ababa, Ethiopia

Abstract

Background: Health care workers are potentially exposed to infections through contact with blood and body fluids while performing their duties. The practice of standard precautions is widely promoted to protect them from exposure to this infection. However; there is suboptimal practice in preventing exposure, especially, in resource limited settings. So this study aims to assess standard precautions practice among health care workers and factors affecting their practice in Mekelle special zone, Northern Ethiopia.

Methods: Institution based cross sectional study with quantitative and qualitative component was conducted among 483 health care workers. Face to face interviewing, observation and FGD were used to obtain information. Descriptive statistics and binary logistic regression analysis were performed.

Results: Of all 483 health care workers 207 (42.9%) of them had good practice of standard precautions. Young health care workers had a good practice when comparing with those older age. The odd of good practice among male likely to be reduced by 50% than female. The study found that, when compared to laboratory technician, doctors and nurses had 80% and 70% reduce odd of good practice respectively. The presence of written guideline and training given for the health care workers were also predictors of standard precautions practice.

Conclusions: There is suboptimal and inconsistent practice of standard precautions in the health care setting that put patients and health care workers at significant risk of acquiring infections. Therefore, the health authorities need to give comprehensive continues and quality in-service training for the HCWs and provision of the necessary infection prevention supplies to maintain optimal practice in the health care setting.

Keywords: Health care workers; Standard precautions; Suboptimal practice; Mekelle special zone

Introduction

Infections in health care services represent a global problem and constitute one of the main causes of morbidity and mortality associated with clinical, diagnostic and therapeutic procedures. Besides their range for patients, the problem is equally important for health care workers (HCWs), who are continuously subject to occupational risks and presents a major risk for the transmission of infection such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV) [1].

Globally it is estimated that about 40% of HBV and HCV infections and 2.5% of HIV infections in HCWs are attributable to occupational sharps exposures. As exposure is a constant premise for professionals, intervention measures have been proposed to minimize this situation, with the implementation of standard precautions as one of the strategies [1-4].

The use of standard precautions is recommended for all patients, regardless of suspected or confirmed infection status. It is applied in any setting in which health care is delivered based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents [5-7]. So these procedures advise HCWs to practice regular personal hygiene, use protective barriers depending on the anticipated exposure and safe injection practices. It also include disposal of sharps, body fluids, and other clinical wastes properly [8-10].

Morbidity and mortality rates due to health care associated infections in patients and HCWs can be reduced by applied standard precautions. Unfortunately despite the simplicity and clarity of these precautions, the practice among HCWs in clinical setting is low, especially in resource limited settings, thus exposing HCWs to risk of infection [11,12].

Sub optimal and non-uniform adherence to standard precautions in both developed and developing countries seemed to be a common practice [3,13]. For instance a study done in North Eastern Nigeria suggested that compliance with hand hygiene was 38.7% among health workers that had the knowledge about the precautions [7]. Similarly, a study done among HCWs in Ethiopia suggested that annual prevalence of needle stick injury was 17.5% which is attributed to risky habits and suboptimal standard precautions compliance [8]. Likewise, the finding was observed in Tigray region of Ethiopia which assessed the incidence of exposure of HCWs to blood and body fluids that, 17.2% of HCWs exposed to needle stick injury and 56.3% of them had contact of blood and body fluid to their skin. These exposures are mainly preventable by compliance with standard precautions [14].

The level of compliance with standard precautions may also differ due to 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 [8,15].

In Ethiopia, there is dramatic increase in the development of health facilities. Despite, Ethiopian Federal Ministry Health have clearly defined policies and procedures to implement universal precautions/

***Corresponding author:** Azeb Gebresilassie, Department of Public Health, College of Health Sciences, Mekelle University, Mekelle, Ethiopia, Tel: +251-912908513, +251-034-441-6683; Fax: +251-034-441-6681; E-mail: azeb18@gmail.com

Received February 25, 2014; **Accepted** May 07, 2014; **Published** May 12, 2014

Citation: Gebresilassie A, Kumei A, Yemane D (2014) Standard Precautions Practice among Health Care Workers in Public Health Facilities of Mekelle Special Zone, Northern Ethiopia. J Community Med Health Educ 4: 286. doi:10.4172/2161-0711.1000286

Copyright: © 2014 Gebresilassie A, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

standard precautions, less emphasis is given at the facility level for the preventive strategies in reducing occupational injuries and increasing conformity with standard precautions [8,16]. Still the problem is important and different study were recommending infection control teams and researchers need to consider the reasons for non-compliance and provide a supportive environment that is conducive to the routine, long-term application of standard precautions [11]; very few studies were conducted in Ethiopia to assess the status of standard precautions practice among HCWs and factors inhibiting the practice. So this study attempted to assess standard precautions practice and associated factors among HCWs who have direct contact with patients in public health facilities of Mekelle special zone, Northern Ethiopia.

Materials and Methods

Institution based quantitative cross-sectional study complemented by qualitative study was conducted in 5 public health centers and 3 public hospitals found in Mekelle special zone, Northern Ethiopia, from January to February 2012. All health care personnel including physicians, nurses, midwives and laboratory technicians who have direct patient care or specimen contact in the study area were included and became 672 professionals. Finally, simple random sampling method was applied in each facility to select the 505 study participants for interviewing. For the qualitative data purposive sampling was used to select discussants for focus group discussion (FGD). Sixteen participants (10 nurses, 2 doctors, 2 Midwives and 2 laboratory technician) were included in the FGD with 2 groups (1 in hospital and 1 in health center) to explore the experience in the practice of standard precautions.

Data were collected using a self-administered structured questionnaire, observational checklist and FGD methods. The tools were developed in English after reviewing relevant qualitative and quantitative literatures in reference to the research question. The variables were checked for clarity and translated into the local language

Variables	Frequency (n=483)	Percentage (%)
Age (yrs)		
20-29	164	34.0
30-39	234	48.4
40-49	85	17.6
Sex		
Male	157	32.5
Female	326	67.5
Profession		
Doctor	35	7.2
Nurse laboratory technician	382	79.1
	66	13.7
Service year(yrs)		
1-10	289	59.8
11-20	143	29.6
21-39	51	10.5
Department		
Internal medicine	37	7.7
Surgery	62	12.8
VCT	22	4.6
Lab	64	13.3
Pediatric	44	9.1
Emergency	29	6.0
Out patient	161	33.3
Gynecology	64	13.3
Level of health Institution		
Referral hospital	209	43.3
Regional hospitals	182	37.7
Health centers	92	19.0

Table 1: Socio-demographic factors of health care workers in public health facilities of Mekelle special zone, Northern Ethiopia.

of *Tigrigna* and then back translated into English to check consistency. Six enumerators who are fourth year Public Health officer students were hired and trained to collect the data and supervision was done at the spot by principal investigator and supervisors. The tools were pretested on a sample of 20 HCWs in a nearby defense hospital and corrections were made accordingly.

Study variables included were socio-demographic characteristics such as age, sex of the HCWs, self-reported practice on standard precautions and factors affecting their practice. Observational checklist was used to observe the general conditions, existing practices, safety, availability and accessibility of materials. Observation lasted on an average 40-50 minute before the structured interview had resumed to the participants on the day of data collection and the particular activities were kept blind not to likely influence normal routine activities. FGD was used to elicit responses on factors affecting practice of HCWs on standard precautions.

The respondents were asked twelve questions to assess their overall standard precautions practice. Considering the practice mean score of the respondents answers to make a dichotomous groups, that those HCWs reported to perform less than and equal to the mean value out of 12 practice questions as 'poor' and HCWs reported to perform greater than and equal to the mean value of stated 12 practice questions as 'good'. Respondents that practice the specific component of standard precaution every time without any interruption considered as 'Always', those individuals practice many times considered as 'Often', those individuals that practice once or two times per year considered as 'Seldom' and individuals that didn't use the specified practice at any time or at any occasion considered as 'Never' practice.

SPSS version 20.0 was used for data analysis. Analysis was made with binary logistic regression to evaluate the relationship of selected independent variables with dependent one. Finally, independent variables found significant and with P-value<0.2 were entered to multivariate logistic regressions to control the effect of confounding. Frequency distributions, percentages and odds ratios (OR) with 95% confidence level (C.I) was calculated for statistical significance tests between variables. Major findings from FGD was narrated and summarized based on thematic areas in terms of the components of standard precautions. Data interpretation for both quantitative and qualitative information was done independently. Triangulations of the interpreted findings were an issue of the study.

Ethical statement

Ethical approval and clearance was obtained from Mekelle University, College of Health Sciences Research and Community Service. All participants were informed about the purpose and significance of the survey to get the consent of the respondents and their full right to refuse, withdraw or completely reject part or all of the study. Participants name were kept confidential throughout the study. The right of participants to anonymity and confidentiality was ensured by making the questionnaire anonymous. Finally written consent was obtained from participants in a form provided with the questionnaire after the data collectors inform the minimum risk and the benefit of the study.

Results

Characteristic of the study participant

A total of 505 study participants were included in the study and 483 HCWs were responded to the study with 95.6 % response rate. As shown in Table 1, majority 382 (79.1%) of the respondents were nurses and midwives; with more than half 326 (67.5%) of were females workers.

Personal protective equipment Practice	Type of personal protective equipment n (%),n=483		
	Glove	Gown/plastic apron	Mask and goggle
Always	419(86.7)	434(89.9)	50(10.3)
Often	56(11.6)	33(6.8)	101(20.9)
Seldom	8(1.7)	15(3.1)	236(48.9)
Never	0(0)	1(0.2)	96(19.9)

Table 2: Practice of personal protective equipment among health care workers in public health facilities of Mekelle special zone, Northern Ethiopia.

Stated reasons For poor practice of Personal protective equipments	Type of personal protective equipment used		
	Glove n (%) (n=64)	Gown n (%) (n=49)	Mask and goggle n (%) (n=433)
Shortage of supply	10(15.6)	35(71.4)	366(84.5)
Carelessness	10(15.6)	0(0)	10(2.3)
Discomfort with use	25(39.1)	12(24.5)	50(11.6)
Might cause fear in patients	19(29.7)	2(6.1)	7(1.6)

Table 3: Reasons for poor practice of personal protective equipments among health care workers in public health facilities of Mekelle special zone, Northern Ethiopia.

Variable	Category	Practice of standard precautions		Crude OR (95% C.I.)	Adjusted OR (95% C.I.)
		Good n	Poor n		
Age of HCWs (in years)	20-29	82	82	3.5(1.9,6.3)	2.6(1.1, 6.4)*
	30-39	106	128	2.9(1.6,5.1)	2.5(1.1, 5.3)*
	40-58	19	66	1.0	
Service year of HCWs	1-10	137	152	2.6(1.3,5.2)	1.2(0.5, 3.2)
	11-20	57	86	1.9(0.9,3.9)	1.1(0.4, 2.6)
	21-39	13	38	1.0	
Sex	Male	53	104	0.6(0.4,0.8)	0.5(0.3, 0.8)**
	Female	154	172	1.0	
Profession	Doctor	10	25	0.2(0.9,0.6)	0.2(0.1, 0.6)**
	Nurse	155	227	0.4(0.2,0.7)	0.3(0.2, 0.6)**
	Laboratory	42	24	1.0	
Written material	Yes	154	152	2.4(1.6,3.5)	1.8(1.2, 2.8)**
	No	53	124	1.0	
Training	Yes	139	171	1.3(0.9,1.8)	1.6(1.0, 2.4)*
	No	68	105	1.0	

**significant at p<0.01 *significant at p<0.05

Table 4: Bivariate and Multivariate logistic regression analysis; a predictor for good practice of standard precautions among health care workers in public health facilities of Mekelle special zone, Northern Ethiopia

There were 209 (43.3%) respondents from referral hospital. The mean age of the respondents was 33.34 ± 6.61 and with a median 10.0 year of work experience in their current job title after the last graduation. About two thirds (64.2%) of the study participant got training on standard precautions.

Health care workers observed practice

From the 170(100%) observed rooms in all health facilities, 109(64%) of the rooms had running water. One hundred sixty three (95.7%) of the rooms had waste collection containers for sharp objects located closer to work area. From all room observed 108(63.4%) of them had written guideline or picture on risk communication. From the 483 observed HCWs, only 174(36%) of them were washed their hands for clinical procedure that need hand hygiene. During the observational period 172(35.6%) of HCWs had contact with blood of whom 131(76.2%, n=172) washed their hands after wards.

A total of 483 injection practices were observed from each HCWs. Fifty-seven (11.8%) of the HCWs recap needles after injection. Regarding waste disposal practice almost all 448(92.8%) of HCWs dispose ward wastes in the labeled containers.

Self-reported practice on standard precautions

From 483 HCWs only 297(61.5%) always practice hand washing after any direct contact with patient, 166(34.4%) practice often and the remaining 20(4.1%) practice seldom. This study further assessed the major reason for poor practice and most of 157(84.4%) of the respondents said that water and soap were not available at patient care areas. As shown in Table 2, majority of the HCWs reported as they 'always' use gloves and gown during procedures that needs this protective equipments. But only 50 (10.4%) of them reported that they 'always' wore Mask and Goggle. As shown in Table 3, the major reasons for poor practice of personal protective equipments like glove, gown and goggle, was shortage of supply.

Two hundred ninety one (60.2%) of the HCWs reported that they exposed to splash of blood or body fluid on their mucus membrane (i.e. eye, nose or mouth) in the last one year. After giving injection or drawing blood from patients 398(82.4%) of the HCWs reported not recapping used needles, 82(17.0%) of them had recapping and 3(0.6%) of them practiced bending needles by hand. Regarding to exposure to sharp or needle stick injury 107(22.2 %) of the HCWs exposed in the last one-year. Carelessness was the major reason stated by HCWs for recapping needles (54.1%, n=85). Discarding used needles and other sharps in a safety box was practiced among 384 (79.5%) of HCWs.

Considering standard precautions practice of the HCWs as 'good' and 'poor', only less than half 207(42.9%) of the HCWs had good practice on standard precautions.

In Table 4, the multivariate analysis showed, the odd of good practice was 2.5 times higher in young age more than HCWs of older age [AOR (95%C.I.)=2.5(1.1, 5.3)]. Odd of good practice was likely to be reduced by 50% among males compared to female [AOR (95%C.I.)=0.5(0.3, 0.8)]. The type of health profession has association with the practice of standard precautions. Compared to laboratory technician, doctors and nurses had 80% and 70% reduced odds of good practice, [AOR (95%C.I.)=0.2(0.1, 0.6)] and [AOR (95%C.I.)=0.3(0.2, 0.6)], respectively. HCWs working in the rooms having written material for risk communication had 1.8 times increase the likelihood of practicing standard precautions than HCWs working in rooms without written material for risk communication [AOR (95%C.I.)=1.8(1.2, 2.8)]. Finally the odd of good practice was likely to be higher by 1.6 times in HCWs trained for standard precautions than those didn't take training [AOR (95%C.I.)=1.6(1.0, 2.4)]. But in this study work experience turned to be insignificant.

Summary result of focus group discussion

The practice of standard precautions varied among participants and by procedures. Discussants emphasized the presence of barriers for the good practice of standard precautions. Shortage of water, soap, personal protective equipments were the main reasons stated by the discussants. A 25 year old Nurse said that;

"Hand washing! It is very necessary, but we don't wash always because, our ward have problem of taps...."

All of discussants agreed on the shortage of at least one of the personal protective equipments. Forty two years old Nurse stated that;

"I had more than ten years of experience but I never use goggle or mask ..."

And the other participant from the hospital shares his experience;

“... I had exposed to blood splash on my eyes because I felt tired and I had no protective device to wear.”

Several participants verbalized that the time constraints imposed by the high patient flow impacted their ability to practice standard precautions. One participant from health center stated that;

“The reason for exposure to needle stick injury or blood splash to eye is due to high patient flow and time constraint...”

Discussion

Health care associated infections in HCWs can be reduced by appropriately and stringently applied standard precautions. But unfortunately, despite the simplicity and clarity of the practices different study showed that the practice within the clinical setting is low [9,11]. Similarly this study found out only less than half (42.9%) of the HCWs had good practice of standard precautions. Level of practice in this study was similar with the study done among Vietnamese HCWs that the percentage score for practice was only 46.1% of the maximum score [12]. These indicate there is suboptimal practice of standard precautions in most of the HCWs and the finding is similar with studies done in different areas [8,12,17,18]. The level of training about standard precautions by the current participants is 64.2% and this finding was much higher than a study done among HCWs in two administrative regions of Ethiopia and India which is 39.6% and 36% respectively [8,19].

Considering that hand washing is the single most important means of preventing the spread of infection and it is one of the components of standard precautions [1,20]. This study assessed the practice of HCWs related to hand washing and found out 61.5% of the them always practiced hand washing after any direct contact with patient. This finding is lower than a study done in southern Nigeria that 85% of the respondents in public facilities always washed their hands [21]. But comparing with a study done among Interns of a Medical College in West Bengal, India, the current finding is higher that was 54.7% of them practice hand washing [22]. However, the observed practice was much less than the reported practice that was only 36% of the HCWs washes their hands during procedures. This difference may be due to social desirability bias; that HCWs exaggerated their reported practice of hand washing than the actual. In addition, shortage of water could be a reason for non-compliance; the idea was supported by the both quantitative and qualitative finding.

For the prevention of potential exposure to blood and other body fluids depend on the type of procedures and personal protective equipments used [15,20]. Almost 90% of the HCWs worn gown and this finding were higher than a study done in America that, overall gown compliance rate of 73% [23]. Similarly, 86.7% of the HCWs always used glove which is higher than a study done in two administrative regions of Ethiopia. This is 79.8% [8].

In this study the use of goggles and/or mask was particularly poor, that only 10.5 % of the HCWs always worn goggles in workplace having exposure to blood and other body fluids. This finding is a bit higher than a study done in Southern Nigeria which is only 5% of the HCWs always worn goggles during deliveries or surgeries [21]. This may be due to shortage of material as supported by the qualitative and quantitative findings.

The study found out 17.0% of the HCWs recapped used needles in the last one year. The finding also supported by observed practice that, 11.8% of HCWs recap used needles. The proportion of recapping

practice was relatively lower than previous study done in two administrative regions of Ethiopia that 46.9% of HCWs recap used needles and this may be due the intervention done in the last two years by the responsibly bodies [8].

Self-reported one-year prevalence of needle stick or sharp injury was 22.2% and this result was almost similar with a studies done in two administrative regions of Ethiopia and another study done in Tigray region, Ethiopia that is 17.5% and 17.2% respectively [8,14]. This study also showed that a large number of HCWs (60.2%) were exposed to splash of blood or body fluid on their mucus membrane in the last one year and this finding was much higher than (20.2%) a study done in two administrative region of Ethiopia [8]. The stated prevalence of needle stick injury and splash of blood or body fluid might happen because of carelessness of the HCWs. The other external reason for high prevalence of needle stick injury and splash of blood or body fluid might be shortage of personal protective equipments, time constraint and high patient flow. This idea also supported by the FGD discussant.

This study also observed that almost all (95.7%) of the rooms had collection material for sharp objects located as closer to the practical area. Provision of sharps collection containers for proper disposal of sharps and placing this containers close to the point of use have a high contribution for prevention of needle stick injuries and recapping of used needles in the health care facilities [8,15]. Comparing with the study done in two administrative region of Ethiopia, the decline in recapping of used needles in this study may be due to the provision of these containers closer to the working area.

The present study also found out significant differences in the practice of standard precautions among different group of HCWs that affects the practice; females were more likely than males to practice standard precautions and this finding was similar with the study done in America [23]. Young HCWs had a good practice of standard precautions when comparing with those old ones. Studies found out significant differences in the practice of standard precautions among different profession and accordingly non-physicians were significantly more compliant than physicians [23]. Similarly, the present study also showed that comparing with laboratory technician, Nurses and Doctors had less likely to practice standard precautions. In this study the odd of good practice was likely to be higher in HCWs trained for standard precautions that who didn't take training. Unfortunately, this finding was dissimilar with a study done in two administrative region of Ethiopia and India that taking training was not found to be a predictor for the good practice [8,19]. A study done in Ethiopia showed that, nurses with less experience were at a higher risk of exposure to infectious diseases and had weak universal precautions practice [24]. But in the present study, work experience had not statistically significant for good practice of standard precautions.

One of the limitations of this study is the possibility of respondents' bias that they were likely to over report their practice. Recall bias is also another dimension which could be a factor for misclassification of practices.

Conclusions

This study concluded that there is a suboptimal and inconsistent practice of standard precautions in the health care setting that increasing the likelihood of acquiring risk from nosocomial infections. The good thing the Ministry of Health of Ethiopia develops clearly defined policies, procedures, and financial mechanisms for the prevention of infection in the health care facilities. As a result the management bodies need to give comprehensive, continues and quality in-service training

for the HCWs. Provision of infection prevention protective devices and sustain the availability of risk communication materials in the facilities. Capital investment is need to be provided to ensure that sinks and running water are available at all times in all patient care areas. Each facility has an infection prevention committee and they need to work to have a close supportive supervision, monitoring and evaluation of standard precautions practice as one of their responsibility.

Acknowledgment

We thank Mekelle University, College of Health Sciences, Department of Public Health and Addis Continental Institute of Public Health for material support to undertake this study. We are also thankful to all respondents for their willing to participate in this study.

References

1. Melo Dde S, Silva e Souza AC, Tipple AF, das Neves ZC, Pereira MS (2006) Nurses' understanding of standard precautions at a public hospital in Goiania - GO, Brazil. *Rev Lat Am Enfermagem* 14: 720-727.
2. WHO (2004) Reducing risks, promoting healthy life. Geneva, Switzerland World Health Organization.
3. Boozary A, Dugani SB (2011) Institute of social justice and medicine: developing a think tank to promote policy formation. *Clin Invest Med* 34: E259.
4. Prüss-Ustün A, Rapiti E, Hutin Y (2005) Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med* 48: 482-490.
5. Sreedharan J, Muttappillymyalil J, Venkatramana M (2009) Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. *Eastern Mediterranean Health Journal* 17: 331-334.
6. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Health Care Infection Control Practices Advisory Committee (2007) Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. *Am J Infect Control* 35: S65-164.
7. Abdulraheem IS, Amodu MO, Saka MJ, Bolarinwa OA, Uthman MMB (2012) Knowledge, Awareness and Compliance with Standard Precautions among Health Workers in North Eastern Nigeria. *Community Medicine & Health Education* 2(3).
8. Reda AA, Fisseha S, Mengistie B, Vandeweerd JM (2010) Standard precautions: occupational exposure and behavior of health care workers in Ethiopia. *PLoS One* 5: e14420.
9. CDC (1989) Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public-Safety Workers. A Response to P.L. 100-607 The Health Omnibus Programs Extension Act of 1988. *MMWR* 38: 3-37.
10. Centers for Disease Control (CDC) (1987) Recommendations for prevention of HIV transmission in health-care settings. *MMWR Morb Mortal Wkly Rep* 36 Suppl 2: 1S-18S.
11. Gammon J, Morgan-Samuel H, Gould D (2008) A review of the evidence for suboptimal compliance of healthcare practitioners to standard/universal infection control precautions. *J Clin Nurs* 17: 157-167.
12. Thu TA, Anh NQ, Chau NQ, Hung NV (2012) Knowledge, Attitude and Practices Regarding Standard and Isolation Precautions among Vietnamese Health Care Workers: A Multicenter Cross-Sectional Survey. *Internal Medicine* 2(4).
13. Kermode M, Jolley D, Langkham B, Thomas MS (2005) Occupational exposure to blood and risk of blood borne virus infection among health care workers in rural north Indian health care settings. *American Journal of Infection Control* pp: 34-41.
14. Gessesew A, Kahsu A (2009) Occupational exposure of health workers to blood and body fluids in six hospitals of Tigray region (August 1-30, 2006): magnitude and management. *Ethiop Med J* 47: 213-219.
15. Sadoh WE, Fawole AO, Sadoh AE, Oladimeji AO, Sotiloye OS (2006) Practice of universal precautions among healthcare workers. *J Natl Med Assoc* 98: 722-726.
16. Ethiopia F, MoH, Yale So PH, Foundation WJC (2007) Blueprint Standards for Hospital Management in Ethiopia and the Accompanying Standards for Hospital Management. New Haven, CT, United States of America Yale Reprographic and Image Services.
17. M Jawaid, M Iqbal, Shahbaz S (2009) Compliance with Standard Precautions: A long way ahead. *Iranian Journal of Public Health* 38: 85-88.
18. Zaveri J, Karia J (2012) Knowledge, Attitudes and Practice of Laboratory Technicians Regarding Universal Work Precaution. *National Journal of Medical Research* 2: 113-115.
19. Kermode M, Jolley D, Langkham B, Thomas MS, Holmes W, et al. (2005) Compliance with Universal/Standard Precautions among health care workers in rural north India. *Am J Infect Control* 33: 27-33.
20. Omiepirisa Y, vonne B (2012) Universal Precautions: A Review. *Nigerian Health Journal* 12(3): 68-74.
21. Johnson OE, Asuzu MC, Adebisi AO (2012) Knowledge and Practice of Universal Precautions Among Professionals in Public and Private Health Facilities in Uyo, Southern Nigeria- A Comparative Study. *Ibom Medical Journal* 5(1).
22. Mukherjee S, Bhattacharyya A, Goswami DN, Ghosh S, Samanta A (2013) Knowledge and Practice of Standard Precautions and Awareness Regarding Post-Exposure Prophylaxis for HIV among Interns of a Medical College in West Bengal, India. *Oman Med J* 28: 141-145.
23. Manian FA, Ponzillo JJ (2007) Compliance with routine use of gowns by healthcare workers (HCWs) and non-HCW visitors on entry into the rooms of patients under contact precautions. *Infect Control Hosp Epidemiol* 28: 337-340.
24. Reda AA, Vandeweerd JM, Syre TR, Egata G (2009) HIV/AIDS and exposure of healthcare workers to body fluids in Ethiopia: attitudes toward universal precautions. *J Hosp Infect* 71: 163-169.