

**Investigating the Compliance with Universal Precautions
among health care providers
in Tikur Anbessa Central Referral Hospital,
Addis Ababa, Ethiopia.**

FASIL TAYE GEBRESELASSIE

A mini-thesis submitted in partial fulfillment of the
requirements for the degree of Masters in Public Health at the
School of Public Health,
University of the Western Cape

**Supervisor: Prof. Jon Rohde
Co-supervisor: Dr Brian van Wyk**

September 2009

Keywords:

Universal Precautions, Compliance, Protection barriers, Health Care Providers, Blood borne pathogens, Occupational exposure, needle stick injuries, in-service training, KAP (Knowledge, Attitude and Practice), Determinants of compliance.

Abbreviations

AIDS	Acquired Immunodeficiency syndrome
CDC	Center for Disease Control
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
OPIM	Other Potentially Infected Materials
OSHA	Occupational Safety and Health Administration
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
UP	Universal Precautions

Definitions of key terms

Universal Precautions

"a set of precautions designed to prevent transmission of HIV, hepatitis B virus (HBV), and other bloodborne pathogens when providing first aid or health care. Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious for HIV, HBV and other bloodborne pathogens"(CDC, 1989).

Occupational Exposure: A reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. "Reasonably anticipated" includes the potential for contact as well as actual contact with blood or body fluids (OSHA, 1991)

Bloodborne Pathogens: Pathogenic microorganisms that may be present in human blood or OPIM (Other potentially infected materials) and can infect and cause disease in persons who are exposed to blood or OPIM containing the pathogen. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Bloodborne pathogens are spread through percutaneous or mucocutaneous exposure with contaminated blood and bodily fluids (Miller, 1997)

Personal Protective Equipment (PPE): Special clothing and equipment worn by employees for protection against hazards, i.e. equipment that does not permit blood or other potentially infectious materials to pass through or reach the employees' clothing, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used. This would include, for example gloves, lab coat, face shield, surgical gown, and protective footwear (OSHA, 1991).

Acknowledgements

I extend my heart-felt gratitude to my advisor Prof. Jon Rohde for his continuous educational feedbacks and providing scientific input into the design and conduct of this study.

My sincere thanks and appreciation will go to my co-supervisor Dr. Brian van Wyk for his advice on technical details of the thesis proposal, Corinne Carolissen and Janine Kader for their prompt and reliable advice and support.

My special thanks go to Dr. Daniel Zewdneh, Medical director of Tikur Anbessa hospital and Dr. Dereje Habte from Addis Ababa University for facilitating and giving full support during the study.

The Ethiopian Public Health Association is also acknowledged for the timely review of the proposal and provision of an ethical clearance.

Finally, I am indebted to the health care providers of Tikur Anbessa Central Referral Hospital who volunteered for this study, and data collectors especially to Ms. Lemlem Hagos and Mr. Ayalew Debash.

DECLARATION

I declare that this is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used have been indicated and acknowledged as complete references.

Fasil Taye Gebreselassie, MD

Student Number- 2706807



Signed


Date...September, 2009.....

Table of content

	Page
Abstract	viii
Background.....	viii
Study Design.....	viii
Data Collection.....	viii
Analysis of Results.....	ix
Conclusion.....	x
1-Introduction	1
1.1- Problem Statement.....	2
1.2- Purpose of the study	4
2-Literature Review	6
3-Study Aims and Objectives	12
3.1- Aim.....	12
3.2- Objectives.....	12
4-Methodology	13
4.1- Study design.....	13
4.2- Definition of terms.....	14
4.3- Study population.....	14
4.4- Sample size and Sampling procedure	14
4.5- Data collection.....	16
4.6- Data collection tools.....	17
4.7- Rigour.....	18
4.8- Data analysis.....	20
4.9- Ethical Considerations	21
5-Results	22
5.1- Demographic Data.....	22
5.2- Knowledge of universal precautions.....	24
5.3- Practice of Universal Precautions.....	28
5.4- Reasons given for not appropriately applying UP.....	34
5.5- Determinant factors for acceptable UP practice.....	35
5.6- Observations.....	38
5.7- Key informant interviews.....	42
6-Discussion including limitations	50

7-Conclusions including Recommendations.....	59
8-References.....	62
9-Appendices.....	72
Appendix 1- Problem analysis diagram.....	72
Appendix 2- Questionnaire to be filled by healthcare providers.....	73
Appendix 3- Guidelines for Key Informant Interview for Health care workers.....	80
Appendix 4- Guidelines for Key Informant Interview for the Medical Director, Department Heads, and Head Nurses.....	81
Appendix 5- Observation checklist.....	82
Appendix 6- Participant Information Sheet.....	85
Appendix 7- Record of informed consent to conduct an interview.....	88

10-List of Tables

Table 1- Socio-demographic and service characteristics of study participants.....	23
Table 2- Knowledge of respondents towards Universal Precautions.....	27
Table 3- Practice of respondents towards UP.....	31
Table 4- Sterilization and waste disposal mechanisms.....	33
Table 5- Factors associated with acceptable UP practice among health workers.....	36
Table 6- Observation conducted in 14 different departments.....	39

11-List of Figures

Figure 1- Exposure to body fluids and puncture.....	24
Figure 2- Knowledge Score of respondents towards UP	25
Figure 3- Knowledge levels of respondent towards UP.....	26
Figure 4- Graph showing the UP Practice Score of respondents.....	29
Figure 5- Graph showing the level of UP practice of respondents.....	30
Figure 6- Reasons for poor compliance towards UP	35

Abstract

Background: Universal Precautions is a set of precaution designed to prevent the transmission of infectious agents to patients and health care providers. Universal precautions for all healthcare workers have been recommended by the Centers for Disease Control and were mandated by the Occupational Safety and Health Administration in 1991. Poor compliance with Universal Precautions among health care providers has become a problem for the medical profession as it is associated with a substantial risk for blood borne infections such as Human Immunodeficiency Virus (HIV), hepatitis B virus (HBV) and hepatitis C viruses (HCV) from sharp injuries and contacts with deep body fluids when they perform their clinical activities. The purpose of this study was to investigate the Compliance with Universal Precautions among health care providers and to find out the different determinant factors that influence compliance in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia.

Study design: A cross-sectional study design with mixed quantitative and qualitative study methods was used.

Data Collection: Quantitative data were collected using a self-administered questionnaire from 104 health care providers selected by a simple random sampling method. The questionnaire had three sections and was designed to collect information on demography, health care providers' knowledge, attitude and practice towards Universal Precautions. Qualitative data were collected using

a face-to-face key informant interviews with nine purposely selected information-rich health care providers and through observation of 14 different departments of the hospital using a checklist.

Analysis of Results: Quantitative data were analyzed using SPSS version 13.0. The mean knowledge score calculated out of a possible maximum score of 13 was 10.62 (SD=2.059) with minimum and maximum score of 5 and 13 respectively. About 44 (42.3%) respondents were found to have a higher knowledge level (knowledge score >11), whereas 26 (25%) had a lower level of knowledge (knowledge score =<9). The mean practice score computed out of a maximum possible score of 21 was 15.13 (SD=3.153) and the minimum and maximum scores were 6 and 21, respectively. The majority of the health care providers (65.4%) received a practice score of >17 and were considered as having an acceptable UP practice (graded as practice level of >80%) while 36 (34.6%) of respondents found to have unacceptable UP practice (grade of <80%).

The thematic analysis of Key informant interviews and observations revealed the lack of sufficient supply of personal protective equipments, unreliable water supply and lack of in-service training on UP. Analysis using Pearson Chi-Square test showed statistically significant correlations between observed compliance

rates and lack of knowledge ($p=0.005$), lack of in-service training ($p=0.004$), and unavailability of personal protective equipment in the hospital ($p=0.007$).

Conclusion

This study has revealed the levels of knowledge and compliance towards Universal Precautions and examined the factors that are influential in having a positive and negative effect on their adoption by healthcare practitioners in practice. Despite acceptable knowledge regarding the potential for infection and mechanisms to prevent these infections, this study has found out that health care workers are not as compliant with universal precautions as they need to be. The findings that compliance correlated directly with knowledge, with in-service training and with availability of protective equipment, provide important indications for future interventions. Therefore a regular on job refreshing training program on Universal Precautions, a written guideline and reminder poster on Universal Precautions and personal protective equipments need to be made available for all health care providers in every department of the hospital for better compliance.

1- Introduction

Universal Precautions are simple infection prevention control measures that reduce the risk of transmission of blood borne pathogens through exposure to blood and body fluids among patients and health care workers (CDC, 1987). Health care workers are at substantial risk for blood borne infections such as HIV, HBV and HCV from sharp injuries and contacts with deep body fluids when they perform their clinical activities. Thus the recommended UP guideline helps health care providers to know the basic principle of infection prevention through hand washing, utilization of appropriate protective barriers, such as gloves, mask, gown and eyewear, and safe handling of needles and sharp instruments in order to reduce the risk of such infections especially with the increasing prevalence of Human Immunodeficiency Virus and Acquired Immunodeficiency syndrome (HIV/AIDS) in the world (Gershon, 1995).

Although universal precautions guidelines have been in place since 1987 (CDC, 1987; CDC, 1989; U.S Department of Labor-OSHO, 1991), suboptimal adherence has been documented extensively (Hersey & Martin, 1994; Saghafi, 1992).

Compliance with UP among health care providers has shown to reduce the risk of exposure to blood and body fluids, however a substantial number of parenteral exposures continue to occur in most health care facilities, needle stick injuries being the commonest occupational health hazard (WHO, 2003). The World Health Organization (WHO) estimates that about 2.5% of HIV cases among

health care workers and 40% of hepatitis B and C cases among health care workers worldwide are the result of these exposures (WHO, 2003). Furthermore, there is a 0.3%–0.5%-occupational risk of infection with HIV after a percutaneous exposure to HIV contaminated blood (Chin, 2000), but the cumulative career risk may be as high as 1%–2% among emergency service staff or surgeons (Wears *et al.*, 1991). Recapping, disassembly, and inappropriate disposal increase risk of needle stick injuries (Haiduven *et al.*, 1992; Khuri-Bulos *et al.*, 1997; Wang *et al.*, 2000). In developing countries, the frequency of these factors gets accentuated with high injection use at health care facilities, most of which are provided with previously used syringes (Pruss-Ustun *et al.*, 2005; Kotwal *et al.*, 2004).

Generally, Universal Precautions practices are important as uncertainties about appropriate safe working practices may lead to occupational hazards and cause injuries to staff. On the other hand, patients may be deprived from appropriate care due to fears or misunderstanding of staff towards the handling of blood or body fluids. Therefore the proper knowledge and practice of UP by the health care providers prevents them from exposure to infections and also avoids the non-humanistic treatment of patients due to fear of infections (Walsh, 1992; Van Servellen *et al.*, 1988).

1.1- Problem Statement

With the advent of improved medical care, there will be an increase in the number of carrier people living with blood-borne pathogens in the general population and an associated increase in occupational health hazards to healthcare providers who are taking care of them. Healthcare providers can accidentally acquire blood borne pathogens as a result of poor compliance to UP.

Poor compliance with UP among health care providers in Ethiopia has become a problem for the medical profession and this is influenced by several factors such as knowledge and attitude of the health care providers themselves, previous organizational culture about UP, availability of UP supplies, views of hospital administration towards UP, policy and strategic issues on UP by the Ministry of Health and Regional Health Bureau (Demessie & Assefa, 2000). (See appendix 1- page 68, for the problem analysis diagram). Addressing the problem associated with poor compliance towards UP will protect the health care providers from acquiring and transmitting deadly diseases to themselves and to patients. In a country like Ethiopia where most of the health institutions do not offer the service of post exposure prophylaxis (PEP) for HIV, not addressing the problem at an earlier stage will further compromise the already low man power in the medical field. In addition, Tikur Anbesa Hospital, where the research is going to be conducted is the main teaching hospital in the country where medical doctors, nurses, and laboratory technicians are trained, so addressing this problem in this

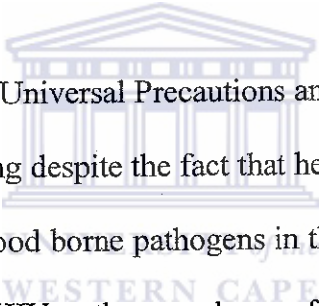
institution will establish a deep rooted knowledge, attitude and practice towards the principles of UP in the newly graduating health professionals.

Provision of basic measures to achieve good compliance with UP among health care providers should be actively encouraged and resourced appropriately by the different stakeholders mainly the government as well as non governmental health institutions as health care workers are valuable asset to the general community and their nation.

1.2-Purpose of the study

In January 1996, the CDC recommended that Universal Precautions be renamed Standard Precautions. Standard Precautions combines the major features of Universal Precautions and Body Substance Isolation (designed to reduce the risk of transmission of pathogens from moist body substances). Standard Precautions apply to the following: 1) blood; 2) all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood; 3) non intact skin; 4) mucous membranes; 5) any unfixed tissue or organ (other than intact skin) from a human (living or dead); 6) HIV-containing cell or tissue cultures, organ cultures, or HIV- or HBV- containing culture medium or other solutions; and 7) blood, organs, or other tissues from experimental animals infected with HIV or HBV. For the purpose of this study Universal Precautions is chosen deliberately over the expanded 1996 CDC definition of Standard Precautions because Ethiopia is a resource-poor country and the health services

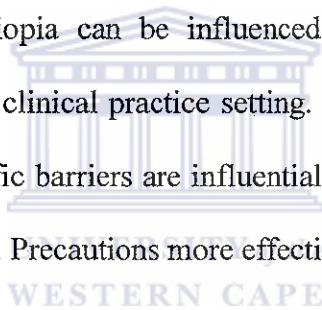
are not in a position to comply to the key components of Standard Precautions and whatever recommendation I came up after the study on Standard Precaution may be impossible or not practical with in the resource setting. Even Universal Precaution was introduced in the country's health care system very recently and its impact has not been well assessed. However the study I am going to conduct will also try to see most of the components of Standard Precautions (Hand hygiene, PPE, Decontamination of equipments/sterilization methods, routine cleaning and waste disposal managements) and transmission based precautions to body fluid splash or contact with contaminated equipments.



Studies on compliance with Universal Precautions among health care providers in Ethiopia are generally lacking despite the fact that health care workers experience occupational exposure to blood borne pathogens in their daily work (Demessie & Assefa, 2000) especially to HIV as the prevalence of adult HIV infection in Addis Ababa was as high as 7.7 % according to the 2005 surveillance data (Federal MOH, 2007). The lack of proper knowledge, attitude and absence of an enabling environment in the health institution, such as a lack of constant running water, shortage of personal protective equipments and waste disposal boxes could 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 health care workers (doctors, trained nurses, auxiliary nurses, laboratory scientists

and domestic staff) who make direct contact with patients. Health care workers have a right to feel their health is protected when caring for patients. So this study will measure the knowledge, attitude and compliance of health care workers towards Universal Precautions and address the determinant factors for good or poor compliance. Such information would be useful in identifying specific knowledge, attitude and practice gaps that may need further attention in the continuing education of nursing, laboratory technologists and medical students and in providing feedback to these groups about improving safe practices.

It is imperative that this research will examine how the attitudes and beliefs of health practitioners in Ethiopia can be influenced and changed to reinforce adherence to UP within the clinical practice setting. It will also help to improve compliance, and what specific barriers are influential in affecting how healthcare practitioners adopt Universal Precautions more effectively in their practice.



2-Literature Review

This review of the literature will try to analyze compliance with universal precautions among health care providers through assessing the knowledge and practice of health care providers towards UP, the relationship of degree of compliance towards UP versus level and type of training of health care professionals and looking into the determinant factors for good and poor compliance towards UP.

A cross sectional study to investigate the knowledge and practices towards UP among 540 health care workers and medical students in two university hospitals in Mazandaran Province, Islamic Republic of Iran showed, the mean knowledge score (of a possible 10) of hospital A staff was 7.34, of hospital B staff was 8.63 and of medical students was 7.81. The reasons given for the difference in the knowledge of the health care providers in the two hospitals was the lack of regular post-employment education on issues of universal precautions in hospital A (Motamed *et al.*, 2004). Most of the staff in both hospitals answered correctly the items related to disposal of sharps (94.9% and 99.3% correct respectively), clearing up blood spills (70.8% and 93.9%), use of mask and gown (96.3% and 99.3%), application of universal precautions with all patients irrespective of their underlying illness (92.6% and 94.3%). Concerning the use of protective devices, almost all respondents agreed on the practice of wearing gloves, gown and eye wear when they were exposed to deep body fluids or blood products.

The level of practice of UP by health care workers may differ from one type of health care worker to another and it is believed that their varying type and level of training might have influenced the differences in knowledge of Universal Precautions (Motamed *et al.*, 2004). A significant relationship ($r = 0.58$, $p < 0.001$) between the respondent's education level and knowledge and practices towards UP was also observed from the study done in two university hospitals in

Mazandaran Province; the group with a bachelor degree or more had the highest knowledge and practice level toward universal precautions than those below diploma level and medical students (Motamed *et al.*, 2004).

Furthermore this study also showed that there was a significant relationship between knowledge and practice of UP and the type of occupation, that laboratory workers had the highest knowledge, followed by midwives, nurses and operating room staff (Motamed *et al.*, 2004).

A cross sectional study done in India to assess HIV related knowledge and compliance towards UP among nurses, student nurses, doctors and lab workers during 2002 in 7 rural hospitals managed by a single nongovernmental organization on a 12 item scale. These 12 items included statements about mode of transmission of blood borne pathogens and principles of UP. The mean knowledge score was 9.5 (range 4–12, SD 1 .71). The compliance with UP showed that 67.6% wore gloves when there was possibility of contact with blood, 53.9% wore apron in procedures whenever there was a possibility of blood or other body fluids splashing and 60.2% did not recap needles. In this study, knowledge score and years of experience were predictors of good UP practice (Kermode, 2004).

In Canada, a national survey conducted in 1995 found out that a high proportion of Canadian dentists reported routine use of gloves (95%), masks (82%), protective eye wear (82%) when splatter is expected, immunization against hepatitis B virus (91%) and routine hand washing before treating each patient and after removing gloves was reported by 76% and 63% of dentists respectively (McCarthy *et al.*, 1995).

Another cross sectional study done in Nigeria via an interviewer-administered questionnaire and observation among 433 respondents that consisted of doctors, trained and auxiliary nurses, laboratory scientists and paramedics revealed about a third of all respondents always recapped used needles but compliance with non-recapping of used needles was highest among trained nurses and worst with doctors (Wilson *et al.*, 2003). Nearly 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, but a significant proportion (94.6%) of health care workers observed hand washing after handling patients, practice proper use of sharp waste disposal containers and screening of transfused blood by the institutions studied was uniformly high (Wilson *et al.*, 2003).

Most surveys have shown that the use of UP significantly decreases the number of incidents of occupation exposure to blood (Beeckmann *et al.*, 1994). Nevertheless, several evidences showed, globally, knowledge of UP is inadequate and the level of compliance with universal precautions is generally low (Gershon *et al.*, 1995). The weakest aspects reported were, not practicing hand decontamination (37%), (Gould *et al.*, 1996), not using barrier protection (30%) and recapping used needles (25%) (Hersey & Martin,1994).

A cross sectional study done in Sweden, showed that the majority of reported cases of occupational blood exposure due to a needle stick injury was among nurses and a minority was among physicians (Lymer *et al.*, 1997). The HIV/AIDS surveillance report by the Centers for Diseases Control and Prevention (CDC) also revealed that nurses are staffs most frequently involved in occupationally acquired HIV infection (CDC, 1993). A study assessing the frequency of body fluid exposure among midwives showed that 65.1% of them had experienced exposure to amniotic fluids or blood at least once in the past 6 months and 25% reported 5 or more such exposures (Turner, 1993).

There are many determinant factors for low compliance with UP among health care provider despite high-perceived risk especially Physicians reported having a lower levels of compliance than nurses and technicians (Gershon *et al.*, 1991). To

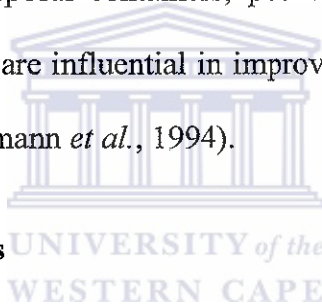
characterize predictors of compliance with UP among hospital-based health care workers in Baltimore, a confidential, self-administered questionnaire was mailed and response was analyzed. Lack of compliance with UP was common; 40% "sometimes" or more frequently recapped needles, 62% reported lack of eye protection, and 37% did not use gloves when needed (Gershon *et al.*, 1991). Most frequent reasons given for lack of compliance despite high levels of knowledge (mean score 23/24) were: force of habit (22%), lack of time (19%), uncomfortable equipment and supplies (13%), patients' needs come first (12%), and too much extra effort (6%) and overestimations of risk (36%) (Gershon *et al.*, 1991).

A variety of interventions have been adopted to improve compliance; however, education in combination with improvement of the safety climate (management support for safety programs, absence of hindrances to safe work practice, availability of personal protective equipment, minimal conflict and good communication among staff members, frequent feedback and training by supervisors, cleanliness and orderliness of the work site) created by the organizations that employ them, remains the most common strategy utilized (Gershon *et al.*, 2000; Talan & Barraff, 1990; Mukti *et al.*, 2000; Huang *et al.*, 2002; Wang *et al.*, 2003; Knight & Bodsworth, 1998).

A larger Australian study, concluded that educational strategies are influential in improving the knowledge and compliance of practitioners and considers

education as an effective means of increasing compliance, a view supported by Beekmann *et al.* (1994). Similarly, Green-McKenzie (2001) suggests that management attitudes, availability of protective equipment and environmental controls are also important. Blake *et al.* (1999) found greater compliance amongst practitioners when protective equipment was available.

Generally studies from several countries have shown that specific intervention strategies, such as education, provision of appropriate personal protection barriers such as gloves, eye wear, apron, shoes, masks, gowns and supplying proper puncture resistant waste disposal containers, posting a reminder sticker in all emergency room and wards are influential in improving knowledge, practice and compliance with UP (Beeckmann *et al.*, 1994).



3-Study Aim and objectives

3.1-Aim

To investigate Compliance with Universal Precautions and the determinants of use among health care providers (doctors, trained nurses, and laboratory scientists) in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia.

3.2-Objectives

- 1- To investigate the knowledge and practice of health care providers towards Universal Precautions in infection prevention.

- 2- To explore factors which impede or promote compliance with Universal Precautions.
- 3- To assess the perceptions around, support for and barriers to uptake of Universal Precautions.
- 4- To make recommendations on how to improve compliance with UP.

4-Methodology

4.1-Study Design

A Cross Sectional study design with mixed quantitative and qualitative study methods was used to investigate the compliance with UP among health care providers in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia. A Cross Sectional study design with its descriptive and analytical nature was chosen for this study as it enables one to describe the prevalence of occupational exposure and the level of knowledge and practice towards Universal Precautions among health care providers and it also enables to associate determinants of Universal Precautions. The qualitative study was conducted before the quantitative study, because in addition to its ability to describe in-depth the experience of health care providers and the social contexts that influence Universal Precautions it also helps to refine the self-administered questionnaire.

4.2- Definitions of terms

Acceptable knowledge on Universal Precaution (>75%)-A knowledge score > 9

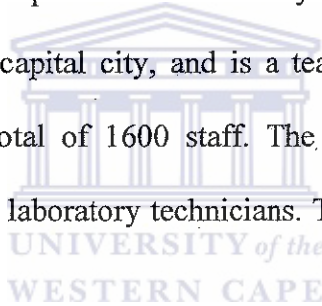
Unacceptable knowledge on Universal Precaution (<=75%) - A knowledge score =<9.

Acceptable Universal Precaution practice (>80%) - A Practice score >=17

Unacceptable Universal Precautions practice (<=80%)-A practice score <17.

4.3-Study Population

The study was conducted in February 2009 in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia. It is the country's Central Referral Hospital, located at the heart of the capital city, and is a teaching hospital under Addis Ababa University with a total of 1600 staff. The medical staff includes 352 Doctors, 366 Nurses and 32 laboratory technicians. The rest were supportive and administrative staff.



4.4-Sample Size and Sampling procedure

-For quantitative study:- Since there was no previous study done on UP among health care workers in the hospital, the assumption used was that 50% of the health care workers would have an overall score of UP practice within the acceptable range (practice level of >80%), 5% level of significance (Alpha error) and 10% degree of precision. It implies that we are 95% certain that the study

finding is within 10% of the truth. With this assumption the sample size was calculated manually and that came up to be 98.

$$N = \frac{DE \times Z_{1-\alpha/2}^2 \times p(1-p)}{d^2}$$

$$= \frac{2(1.96)^2 \times 0.5 \times 0.5}{(0.1)^2}$$

$$= 98$$

Where

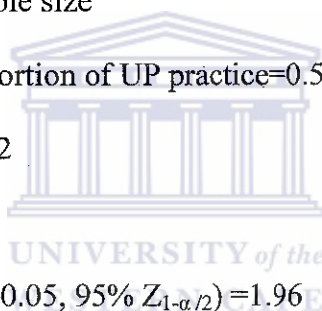
N= the required sample size

P =the assumed proportion of UP practice=0.5

DE= Design effect= 2

d = precision= 0.1

Confidence level ($\alpha=0.05$, 95% $Z_{1-\alpha/2}$)=1.96



To address non-response, additional 10% of the sample size was included making a total of 107.

All laboratory technicians ($n_3=32$) were taken as their total number in the hospital was 32 with the aim of maximizing their representation. The number of doctors and nurses to be interviewed were proportionally allocated from the remaining sample size as Doctors ($n_1=37$) and Nurses ($n_2=38$).The principal investigator used the list of doctors and nurses obtained from the medical director's office as a

sampling frame in order to recruit and sample the study participants. The serial number of the list were used as a sample identifier and study participants were identified via a Simple Random Sampling method using computer generated random numbers.

-For the qualitative study: - A purposive sampling method was used in order to select information-rich health care providers for in-depth interviewing. Health care providers of different categories with a clinical experience of greater than five years and/or having administrative roles were considered as better informants. The numbers of qualitative interviews conducted were nine as saturation of information was achieved and interview stopped when no new information was forthcoming from further interviewing.



4.5-Data Collection

Data was collected through Qualitative and Quantitative methods. Survey questionnaires, Key Informant Interviews & Observation were used for data collection. Two supervisors who are not known to the participants and with Bachelor degrees in health related discipline were recruited and given five days training on data collection methods by the investigator. They were able to tell study participants about their selection for the study, have their consent, remind & collect filled questionnaires from a box organized for this purpose in each ward,

carry out overt observations and tape record while the principal investigator conducted key informant interviews.

4.6-Data collection tools and procedures -

4.6.1- Key Informant Interviews- a face-to-face Interview was conducted for qualitative study and the supervisors assisted in tape recording and transcription of interviews. The interview guide was semi-structured and developed by the findings from the literature review. In-depth interviewing included leading the respondent through a series of prepared questions and Prompts & Probes. The interview was undertaken in an isolated empty room one by one and continued until saturation of information was achieved. The field notes and full interview were recorded and kept for reanalysis. (For interview guideline, see Appendix 3 and 4).

4.6.2-Questionnaires- For quantitative study a self-administered questionnaire that was adopted from similar research endeavor at national level and improved based on literature reviews and the issues arising from the qualitative interviews. It was pre-tested in Zewditu hospital, Addis Ababa and then amended based on the pre-testing findings (appendix 2, page 73) before distribution to the study participants. The questionnaire had three sections. Section one was designed to collect information about demographics that include age, gender, years of professional experience, department attribution, and exposure to refreshing

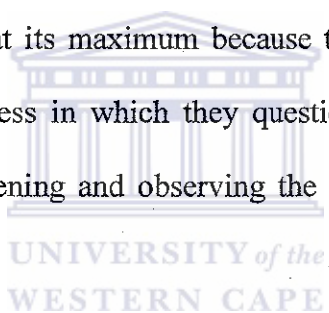
training sessions. Section Two measured the health care providers' knowledge of Universal Precautions. It was composed of 13 questions each having a score of one. The knowledge score was computed for each respondent out of a possible maximum score of 13. Section three investigated the health care providers' self-reported compliance with Universal Precautions in their daily practice and other key measures of infection control in clinical practice, including use of disposables, sterilization technique and waste disposal methods. A practice score was calculated for each respondent out of a possible maximum score of 21. These questions also assessed respondents' characteristics and attitude towards Universal Precautions.

4.6.3-Observation- A Checklist was used to collect data from fourteen different departments of the hospital (Appendix 5). The investigator and supervisors together checked the hospital general out patient department, emergency rooms, wards, intensive care unit, delivery rooms, procedure rooms, laboratory and operation theaters for presence of informative posters or stickers about UP, running water, availability and utilization of protective barriers and puncture resistant waste disposal containers.

4.7-Rigour

4.7.1-Qualitative rigor- The fact that there was a detailed description of the research setting, why and how the research was done increase its credibility. The methods of data collection were clearly articulated and conducting the interview

with a supervisor as a team has strengthened the dependability of the data. The fact that methods were devised for checking the data quality, having a proper strategy for data analysis, discussing competing hypothesis during interviews, taking into account negative findings, and preserving the tape recorded data for reanalysis has increased the rigor and credibility of the study (Lincoln & Guba, 1985). The use of multiple ways of investigating compliance with Universal Precautions through data source triangulation and method triangulations (using key informant interviews, observations and questionnaires) has also increased the rigor of the study. Since two people were conducting the key informant interview as a team, reflexivity was at its maximum because the researchers' critical self awareness was a vital process in which they question and observe themselves while at the same time listening and observing the participant (Pricilla, *et al.*, 2005).



4.7.2-Quantitative rigor- The data collection methods were believed to be reliable and valid because data was collected from different sets of health care workers such as doctors, nurses and laboratory technicians which was believed to have ensured accurate representation that reduces biases. The questionnaire was adopted from a similar research endeavor at national level (Demessie & Assefa, 2000) and enriched by literature reviews and the qualitative interviews . The questionnaire was pre-tested and refined before administration and data was

collected from educated people through self-administrated questionnaire. The use of pre-tested questionnaire, the assumptions used in sample size calculation, inclusion of variety of health care workers, and the statistical analysis plan and interpretation ensured the generalisibility of the study. Reliability of tool, training of assistants and type of sampling used also enhanced the rigor.

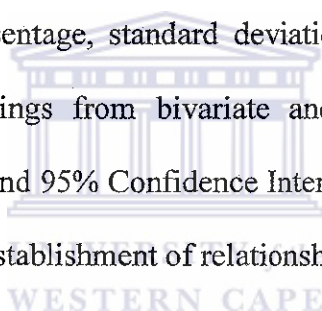
4.8-Data Analysis

Data processing of the quantitative study was started after checking for completeness and clarity of information. Qualitative data analysis involved: categorizing the data, coding, and summarizing by a computer and manually.

4.8.1-For qualitative data: -The field notes taken during the Key Informant Interview were thematically analyzed on a daily basis. Tape-recorded data were transcribed and translated word by word and preliminary analysis was done to possibly include newly emerging themes. After nine interviews redundancy was achieved. Then data checked and coded to characterize important or recurring information under selected themes based on the question guides and summarized manually.

4.8.2-For data collected through observation, a descriptive analysis in terms of percentage was used as far as quantitative information was concerned. Findings of qualitative observations were also summarized in to relevant thematic areas.

4.8.3-For quantitative data: - analysis was started by description of the data for each variable for all the study units included in the sample. Quantitative data was double checked before entered into the SPSS version 13.0 software for validation. The same software was used for data cleaning, coding, and analysis. Descriptive analysis was made to present the findings such as measures of central tendency, frequency distribution, percentage, standard deviation, and Chi square with p-value. The computed findings from bivariate and multivariate analysis are presented with Odds Ratio and 95% Confidence Interval to depict the comparison between groups and/or the establishment of relationships between variables.



4.9-Ethical Considerations

Ethical clearance was obtained from the Ethiopian Public Health Association and letter of permission was secured from the hospital administration. It was emphasized that participation in this study was entirely voluntary and unconditional withdrawal was possible. Participants were provided with participant information sheet (Appendix 6) that explains the purpose, description and their involvement in the study. They were assured of the anonymity and

confidentiality of response and were requested to sign the participant informed consent form (Appendix 7) should they be willing to participate in the study. It was also informed that the research will cause no harm to participants and may not have a direct benefit to them but in the long run the information gained will empower the right to feel their health is protected when caring for patients.

. Results

5.1-Demographic Data

A total of 107 questionnaires were distributed and 105 (98.1%) were returned. However, one questionnaire was discarded because of incomplete data leaving 104 (97.2%) questionnaires for analysis. The respondents were, Doctors 36 (34.6%), Nurses 38 (36.5%) and Laboratory technicians 30 (28.8%). Among the respondents 17.3% had an experience of one year and below, 28.8% had 2-4 years, 14.4% had 5-9 years, 24.0% had 10-20 years and 15.4% had more than 20 years of clinical experience. The majority of health care workers practiced in more than one department. The demographic data of the respondents is presented in Table 1.

Over the past one year the proportion of respondents who had a history of exposure to blood or body fluids through splash to skin, face, mucous membrane and eye was higher 70 (67.3%) than those who had injuries via needle stick 29 (27.9) and sharps 18 (17.3) (see figure1).

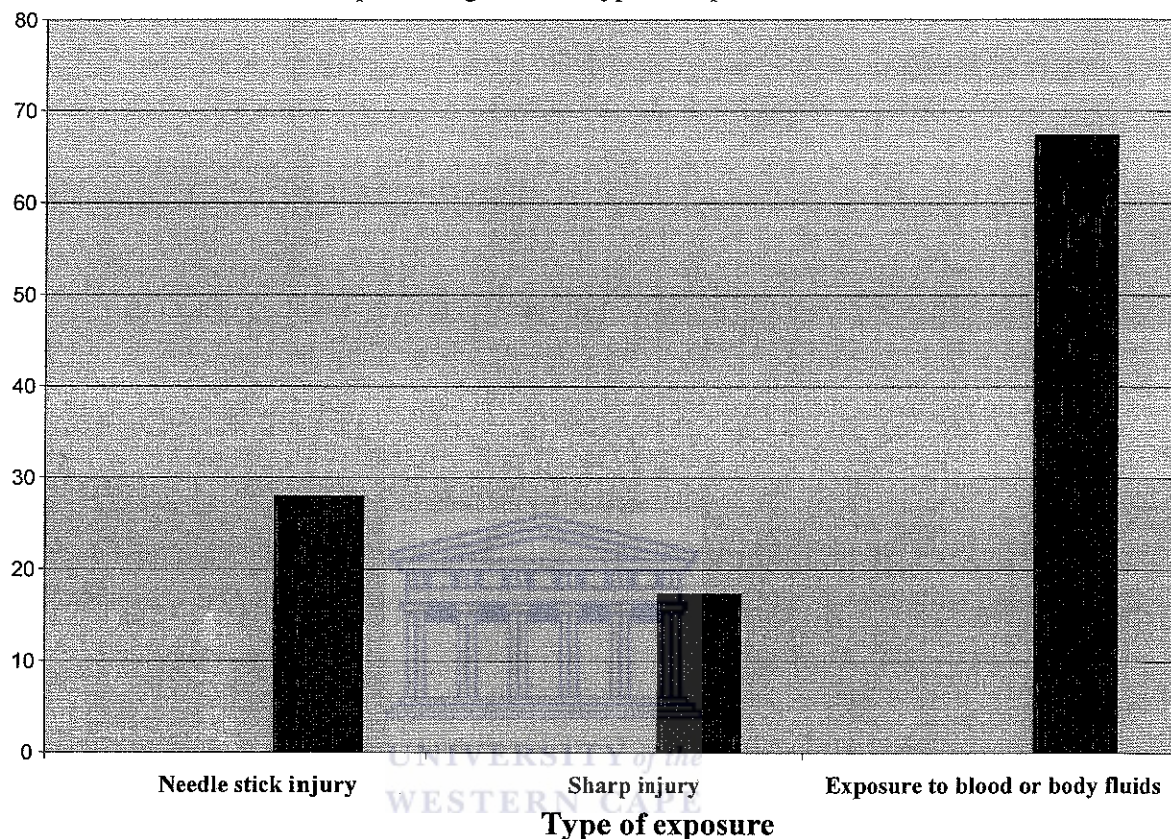
Table 1- Socio-demographic and service characteristics of study participants,

Characteristics (N=104)	Frequency (%)
Age	
21-25	29(27.9)
26-30	31(29.8)
31-40	22(21.2)
>=40	22(21.2)
Sex	
Male	53(51.0)
Female	51(49.0)
Profession	
Medical Doctor	36(34.6)
Nurse	38(36.5)
Laboratory Technician	30(28.8)
Year of service	
One year and below	18(17.3)
2-4 years	30(28.8)
5-9 years	15(14.4)
10-20 years	25(24.0)
>=20 years	16(15.4)
Department *	
General OPD	26(25.0)
Gyne. ward & delivery room	18(17.3)
Surgical ward	26(25.0)
Emergency OPD	30(28.8)
Operation room	14(13.5)
Laboratory	30(28.8)
ICU	8(7.7)
Medical ward	21(20.0)
Pediatric ward	18(17.3)
Orthopedics	5(4.8)

** Percentage exceeds 100% as some health care workers worked in more than one department*

Figure 1-Exposure to body fluids and puncture

Percent of health workers experiencing different types of exposure



5.2- Knowledge of universal precautions

Knowledge score was computed from 13 items each having one point. The mean knowledge score in this study was 10.62 (SD=2.059) with minimum and maximum score of 5 and 13 respectively (figure 2). Most of the respondents (75%) received a score between 10 and 13. The 25th percentile of scores fell at 9.25 whereas the 75th Percentile fell at 12.0. Mean knowledge score of Doctors 11.36 (SD=1.515) was the highest followed by laboratory technicians 10.63

(SD=2.297) and least for nurses who had a mean knowledge score of 9.89 (SD=2.103). Those having a knowledge score >11 were 44 (42.3%) and considered to be as having a higher knowledge (>85%) whereas those having a knowledge score ≤9 were 26 (25%) and considered as having a lower level of knowledge (<75%). Those who have a knowledge score in between were considered as having a medium knowledge level 34 (32.7%) (Figure 3). Health care providers with a knowledge score of >9 were considered to have an acceptable knowledge level (75%).

Figure 2- Knowledge Score of respondents towards UP

Percent of health workers

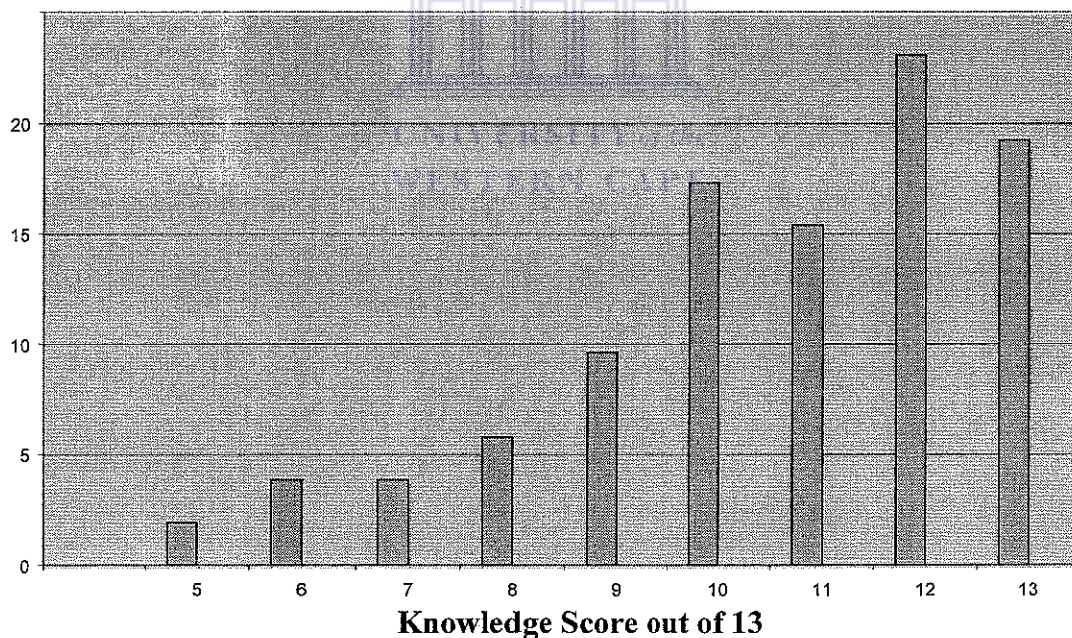
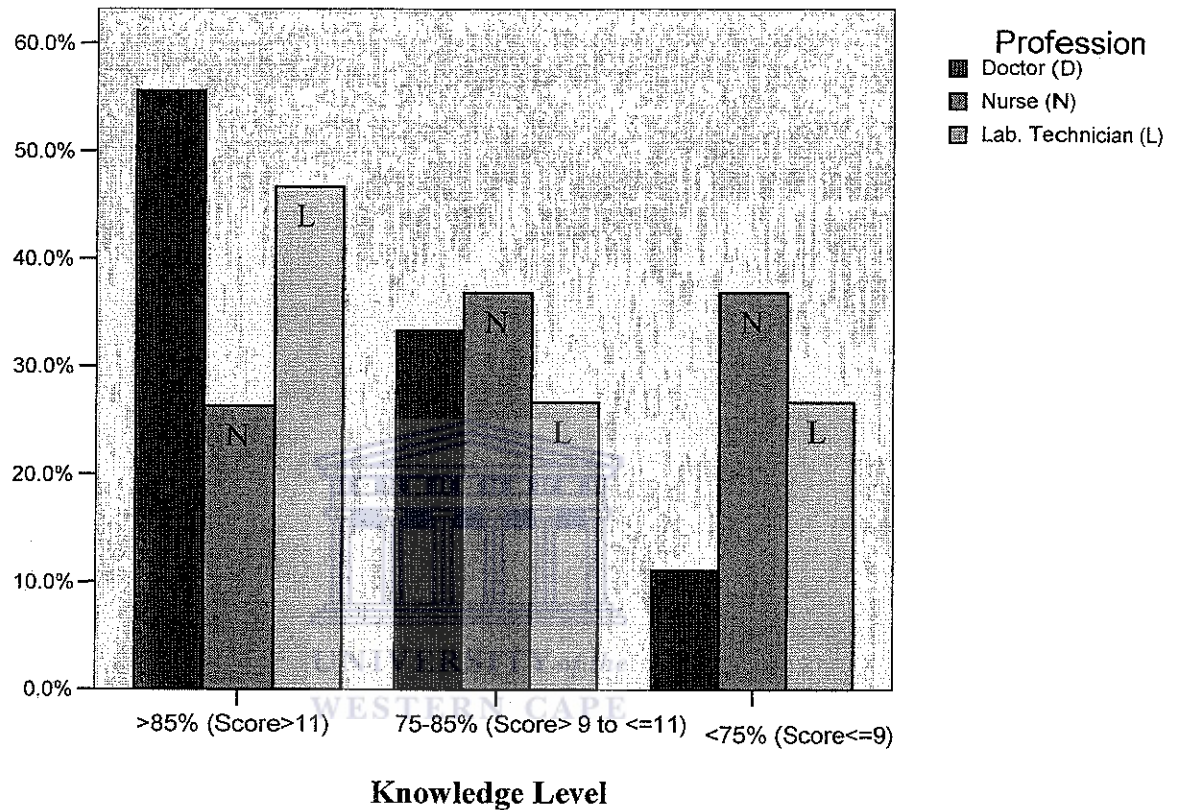


Figure 3- Knowledge levels of respondent towards UP

Percent of health workers



The large majority, 95(90.4%) of respondents answered that UP should be applied to all persons regardless of their infection status. A total of 92(88.5%) assume that blood and all body fluids of patients are infectious. Concerning diseases that can be transmitted through contaminated needles and sharps, 100(96.2%) knew that

HBV is the commonest followed by HIV 91(87.5%) and HCV 69(66.3%). About knowledge of possible infection prevention measures for HIV exposure through accidental injury 86(82.7%) answered washing immediately with soap/ antiseptics as first step and 89(85.6%) mentioned the use of post exposure prophylaxis (PEP) medication. Most of the respondents (93/104) new that personal protective materials such as masks, gowns, gloves and goggles are necessary if procedures and patient-care activities are likely to cause splashing of blood or deep body fluids. However, about one third of the respondents 35(33.7%) believe that used needles can be recapped after giving an injection (Table 2).

Table 2-Knowledge of respondents towards Universal Precautions

Variables (N=104)	Frequency (%)
UP is applied to patients with HIV and HBV only Yes No	10(9.6) 94(90.4)
UP should be applied to all persons regardless of their infection status. Yes No	95(90.4) 9(8.7)
Common diseases that may be transmitted through contaminated needles and sharps? HBV HCV HIV Doesn't know	100(96.2) 69(66.3) 92(88.5) 2(1.9)
Used needles can be recapped after giving an injection. Yes No	35(33.7) 69(66.3)

Possible infection prevention measures for HIV exposure through accidental injury	
Wash immediately with soap/ antiseptics	86(82.7)
Use medication (PEP)	89(85.6)
Use antibiotics immediately	4(3.8)
No preventive measures	1(1.0)
I don't know	3(2.9)
Prophylaxis to HIV after exposure by needles or sharp injury.	
Available	97(93.3)
Not available	6(5.8)
Don't know	1(1.0)
Isolation is necessary for patients with blood borne infections	
Yes	18(17.3)
No	80(76.9)
Doesn't know	6(5.8)
Blood spills should be cleaned up promptly with sodium hypochlorite	
Yes	62(59.6)
No	24(23.1)
Doesn't know	18(17.3)
I assume that blood and all body fluids of patients are infectious	
Yes	92(88.5)
No	10(9.6)
Doesn't know	2(1.9)
Masks, gowns, gloves and goggles are not necessary if procedures and patient-care activities are likely to cause splashing of blood or deep body fluids.	
Yes	10(9.6)
No	93(89.4)
Doesn't know	1(1.0)

5.3- Practice of Universal Precautions

The practice score was computed to each respondent out of a possible maximum score of 21 using 13 questions. The first five questions were each given a score of

one point where as the last 8 question were each given a maximum score of two points for each question as they were more sensitive in determining the practice level. The mean practice score in this study was 15.13 (SD=3.153) and the minimum and maximum score were 6 and 21 respectively (Figure 4). Nurses had a relatively higher mean practice score 15.24 (SD=3.053) than laboratory technicians 15.20 (SD=3.167) and doctors had the least mean practice score 14.97 (SD=3.325). Those who had an acceptable UP practice (graded as practice level of >80%) received a practice score ≥ 17 and accounts for 68 (65.4%) of respondents while 36 (34.6%) of respondents found to have unacceptable UP practice (grade of $\leq 80\%$) (Figure 5)

Figure 4- UP Practice Score of respondents

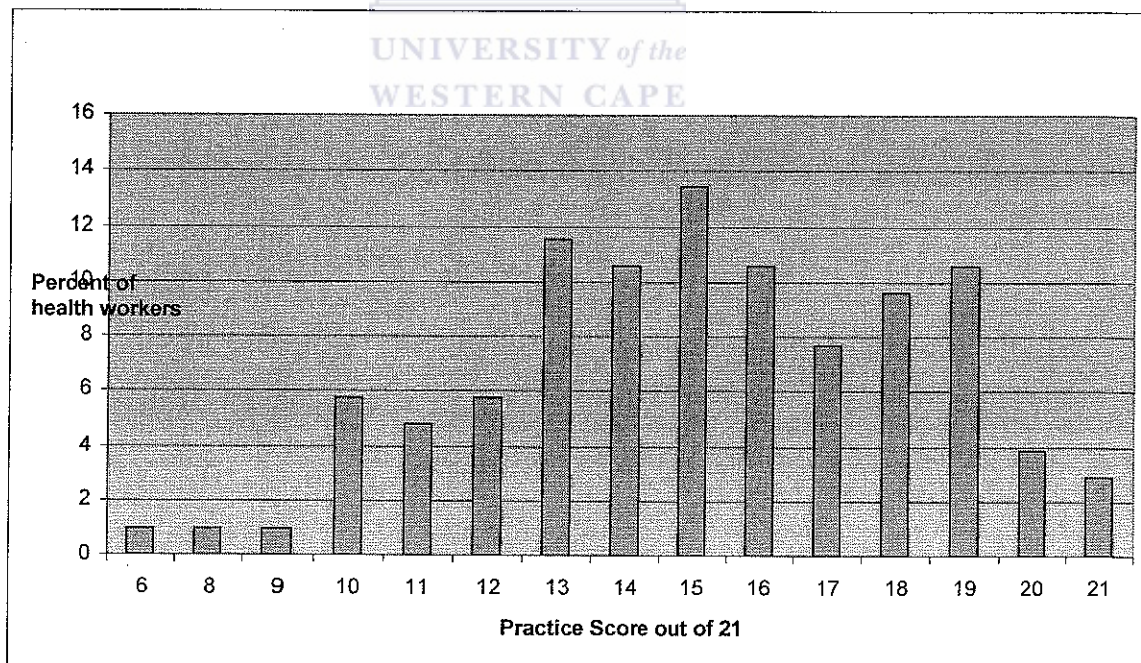
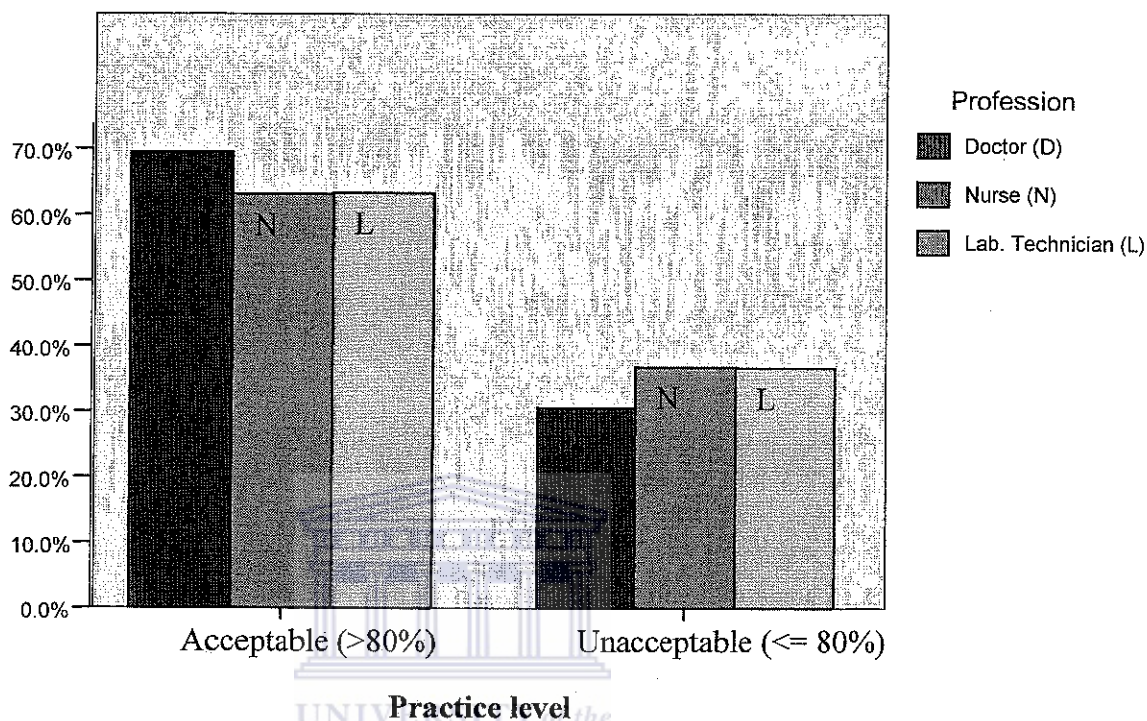


Figure 5- UP practice of respondents

Percent of health workers



With regard to the use of protective devices, the respondents attained a high compliance rate of 92(85.5%) on the practice of wearing gloves when they were exposed to deep body fluids or blood products. Similarly a better compliance rate was attained on the practice of wearing gown/apron 63(60.6%). Regarding the use of facemasks and eye shields/goggles when there is a possible splash or splatter only 39(37.5%) answered they always wear face masks while as low as 32(30.8%) answered they always use eye shields/goggles when exposed to splashing of bloody discharge or fluids. The majority of respondents 90(86.5%)

dispose used needles into a puncture resistant waste disposal container after injection but only 46(44.2%) never recap used needles after giving an injection (Table 3). Regarding hand washing 100 (96.2%) wash hand after handling objects that might be contaminated and 102(98%) wash hands after contact with blood or mucous membranes.

Table 3- Practice of respondents towards Universal Precautions

Variable (N=104)	Frequency (%)
Washing hands thoroughly before handling and putting on gloves. Yes No	63(60.6) 41(39.4)
Washing hands after handling objects that might be contaminated. Yes No	100(96.2) 4(3.8)
Washing hands after contact with blood or mucous membranes. Yes No	102(98.1) 2(1.9)
Wash hands after removing gloves. Yes No	91(87.5) 13/104(12.5)
Use of antiseptic hand rub (if available) before and after contact with each patient. Yes No	69(66.3) 35(33.7)
Use of protective eye wear (goggle) for procedures and patient care activities that can cause blood/body fluid splashing. Always Sometimes Never	32(30.8) 41(39.4) 31(29.8)

Use of mask for procedures and patient care activities that can cause blood/body fluid splashing. Always Sometimes Never	39(37.5) 50(48.1) 15(14.4)
Use of gown/apron for procedures that can cause blood/body fluid splashing. Always Sometimes Never	63(60.6) 33(31.7) 8(7.7)
Use of waterproof boot for procedures that can cause blood/body fluid splashing. Always Sometimes Never	13(12.5) 33(31.7) 58(55.8)
Wear gloves as the first step in procedures, patient care activities and cleaning surfaces contaminated with blood or other body fluids Always Sometimes Never	92(88.5) 11(10.6) 1(1.0)
Dispose used needles into a puncture resistant waste disposal container after injection. Always Sometimes Never	90(86.5) 12(11.5) 2(1.9)
Wear gloves or cover wounds in my hand with waterproof dressing before caring of patients. Always Sometimes Never	92(88.5) 11(10.6) 1(1.0)
Recap used needles after giving an injection. Always Sometimes Never	36(34.6) 22(21.2) 46(44.2)

The nurses, laboratory technicians and some medical doctors (n=78) gave their response about sterilization and waste disposal mechanisms and 53 (67.9%) use

Table 4-Sterilization and waste disposal mechanisms

Variables (N=78)	Frequency (%)
Clean instruments and other items before sterilization. Yes No	69(88.5) 9(11.5)
Sterilize equipments in the assigned department Yes No	62(79.5) 16(20.5)
Means of sterilization in the department. Socked in antiseptic. solution Incinerating Boiling Autoclaving Others, UV light, hot air oven	33(42.3) 11(14.1) 7(9.0) 53(67.9) 1(1.78)
Availability of sufficient quantities of puncture resistant waste disposal container. Sufficient Not sufficient Never I don't know	51(65.4) 23(29.5) - 4(5.1)
Type of needle, syringes and sharp collection box Safety box Liquid proof Open container Puncture proof	71(91.0) 5(6.4) 8(10.3) 11(14.1)
Immediate disposal of needles, and sharps Yes No	69(88.5) 9(11.5)
Disposal of used needles, syringes, and sharps in the health facility. Open incineration Protected incineration Open dumping Burial in a pit Dumping I don't know	9(11.5) 48(61.5) 5(6.4) 8(10.3) 3(3.8) 20(25.6)

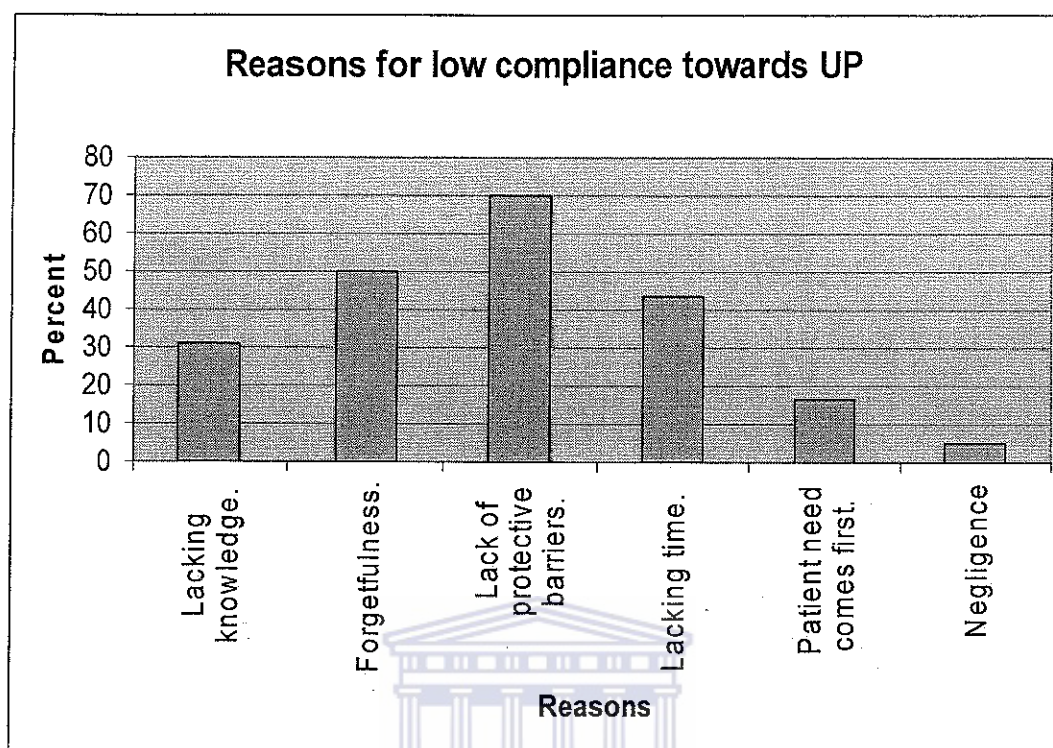
autoclaving as a means of sterilization in their respective department and 71 (91%) use a safety box to dispose needle, syringes and sharps. A higher proportion of respondents 48 (61.5%) knew that used needles, syringes and sharps need be disposed via protected incineration (Table 4).

5.4- Reasons given for not appropriately applying Universal Precautions

The major reasons given by respondents on why health care providers have low compliance with Universal Precautions included: lack of protective barriers 52 (70.2%), forgetfulness 52 (50%), lacking time due to high job demands that had caused respondent to be in a hurry 45 (43.3%), lacking knowledge 32 (30.8%), and no running water for hand washing 47 (45.2%). Other reasons given by the respondents were patient need comes first 17 (16.3%) and negligence 32 (4.8%) (Figure 6).

The reasons given by those who don't wash their hand before and after patient care were mainly inadequate supplies for hand washing such as soap and towel (81.7%), high load of patients (59.6%), inaccessibility of sinks (48.1%), no running water (45.2%), and lack of time (36.5%) but very few responded as concern over the deleterious effect of frequent washing on hands (5.8%), negligence (4.8%) and patient's psychology (1%).

Figure 6 –Reasons for poor compliance towards UP



5.5-Determinant factors for acceptable UP practice

Different variables such as gender, profession, year of service, knowledge score, in-service training and availability of UP supplies were analyzed as possible determinant factors for appropriate UP practice using Pearson Chi-Square (Table 5).

Table 5- Factors associated with acceptable UP practice among health workers

Variables	UP Practice		Chi-Square with P-Value
	Acceptable	Unacceptable	
Sex Male Female	19(35.8) 17(33.3)	34(64.2) 34(66.7)	Chi-Square=0.073 P=0.787
Profession Medical Doctor Nurse Lab. Technician	11(30.6) 14(36.8) 11(36.7)	25(69.4) 24(63.2) 19(63.3)	Chi-Square=0.401 P=0.818
Year of service 0-4 5-9 10-20 ≥ 20	11(22.9) 5(33.3) 12(48) 8(50)	37(77.1) 10(66.7) 13(52) 8(50)	Chi-Square=6.565 P=0.087
Knowledge score >85% 75-85% <75%	23(52.3) 7(20.6) 6(23.1)	21(47.7) 27(79.4) 20(76.9)	Chi-Square=10.546 P=0.005
In-service training Yes No	27(46.6) 9(19.6)	31(53.4) 37(80.4)	Chi-Square=8.255 P=0.004
Availability of UP materials Always Sometimes Never	6(46.2) 26(44.1) 4(12.5)	7(53.8) 33(55.9) 28(87.5)	Chi-Square=10.009 P=0.007

The only statistical significant findings as determinant factor for proper UP practice were knowledge (Chi-Square=10.546, **P=0.005**), in-service training (Chi-Square=8.255, **P=0.004**) and availability of UP supplies (Chi-Square=10.009, **P=0.007**).

To examine the strength of association and level of significance of the different variables as determinants of acceptable UP practice, a logistic regression was used to calculate the Odds Ratio and 95% CI. The significant difference observed on knowledge, In-service training and availability of UP supplies by the above mentioned Chi-Square was proved to have strong association by the logistic regression. All the three variables i.e. knowledge OR = **0.197 (95% CI: 0.052, 0.755)**, in-service training **0.28 (0.10, 0.73)** and availability of UP supplies **0.130 (0.020, 0.834)** were strong and statistically significant determinants of acceptable UP practice.

Those who have a knowledge score <75% were 0.197 times as likely to have acceptable UP practice as compared to those with knowledge score >85% or there was an 80% reduction in acceptable UP practice among health workers whose knowledge score was <75% as compared to the reference category.

Those who didn't receive an in-service training were 0.28 times as likely to have acceptable UP practice as compared with those who received an in-service

training or there was a 72% reduction in acceptable UP practice among health care providers who didn't receive an in-service training as compared to those who received an in-service training.

Those who said UP materials were never available were 0.13 times as likely to have acceptable UP practice compared with the ones who reported UP materials were always available. In other words there is an 87% reduction in acceptable UP practice if UP materials are not always available.

5.6-Observations

Observation was conducted in 14 different departments in the hospital. Seventeen items were checked using a separate check list for each department and the following results were obtained. Half of the observed departments were not clean, with potential contamination of syringes and needles with blood or other body fluids. There was no poster or guideline on Universal Precautions in all observed departments. In most of the departments 9(64.3%) there were contaminated needles and sharps in places where they could expose health care providers to needle stick injury. This was due to the fact that patients were requested to buy their own medical supplies like needles, syringes, intravenous fluids and cannulas and keep them by their bed side. Almost all departments 13/14 utilize household bleach as a disinfectant for soaking of used instruments and cleaning of surfaces contaminated with blood or body fluids. Among the personal protective materials

gloves and gown/apron were available and being utilized in most (13/14) departments whereas goggles and masks were hardly available in 3/14 departments. Concerning disposal of wastes there was a good practice of separating waste by type 13 (92.9%), availability of safety boxes 14 (100%) and presence of incinerator 14 (100%) for eliminating solid medical waste. The condition of the sharp collection box during data collection revealed that 5 (35.7%) were overfilled, 2 (14.3%) were torn and needles were seen through the hole (Table 6). A PEP kit with a written guideline on how to use was centrally available to all departments but review of documents revealed that a total of 6 health care providers (two of them in the study sample) took PEP for HIV between September 2008-May 2009. This is in spite of the fact that nearly 70% reported exposure to blood and body fluids and over 25% had experienced needle stick injuries (figure 1).

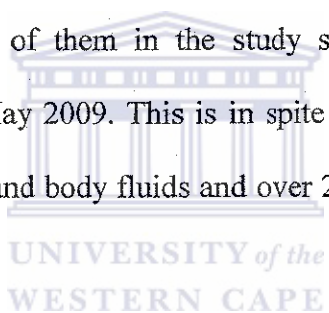


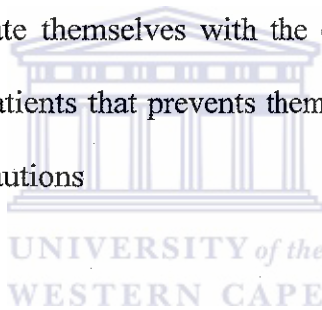
Table 6- Observation conducted in 14 different departments of Tikur Anbessa hospital, 2009.

Variables (N=14)	Frequency (%)
Presence of guideline on Universal Precautions Yes No	- 14(100)
Presence of posters on Universal Precautions Yes No	- 14(100)
Cleanness of the injection and emergency rooms. -Clean and no potential contamination of syringes and needle with blood or other body fluids. -Not clean and potential contamination of syringes and needle with blood or other body fluids - Moderately clean	4(28.6) 7(50.0) 3(21.4)
Presence of contaminated needles and sharps in places where they expose health care workers to needle stick injuries Yes No	9(64.3) 5(35.7)
Presence of functional running water and hand washing facility. Yes No	11(78.6) 3(21.4)
Ways the instruments or sets are sterilized or put ready for use. Soaked in antiseptic solution Boiled and packed in cloth Autoclaved and packed with cloth	9(64.3) - 14(100)
Full functionality of autoclave/steam sterilizer. Yes No	13(92.9) 1(7.1)
Appropriate storage conditions for processed items to maintain sterility or HLD Stored items in a dry location Stored items in wet location Stored items mixed with un sterile equipments Wrapping storage items in a sterile cloth sealed with TST tape In sterile container with lid that clasps shut	9(64.3) - - 11(78.6) 9(64.3)
Documentation of date of sterilization. Documented Not documented	14(100) -

Presence and utilization of disinfectants (sodium hypo chlorite or household bleach).	
Yes	13(92.9)
No	1(7.1)
Availability and utilization of personal protective materials.	
Goggles,	3(21.4)
Gloves,	13(92.9)
Gown /apron	13(92.9)
Masks	3(21.4)
Handling and disposal of medical waste appropriately	
Separating waste by type	13(92.9)
Collecting and transporting waste with in the facility	13(92.9)
Storing waste with in the unit until it can be disposed of.	14(100)
Disposal of sharps (needles, blades, and other sharps)	
Safety box	14(100)
Open container	-
Puncture proof	-
Not available	-
Eliminating solid medical waste	
Burning in an incinerator	14(100)
Open burning	-
Burying	-
Transporting waste to an off-site disposal site	-
Disposed of on the premises	-
Disposed of on pit surrounded by fence.	-
How was the condition of the collection box during data collection?	
Over filled	5(35.7)
Torn and needles seen through the hole	2(14.3)
Empty or few dirty syringes and needle inside it	9/14(64.3)
Eliminating liquid medical waste	
Down a sink, drain, or toilet	13(92.9)
Burying	-
Other (specify)	-
Adequate disposal of hazardous waste (used bandage, cotton, contaminated waste etc...)	
Burning in an incinerator	14(100)
Open burning	-
Burying	-
Transporting waste to a temporary disposal site in the hospital	-
Availability of PEP kit (24 hours) in the department/hospital.	
Yes	14(100)
No	-

5.7-Key informant interviews

The key informant interviews were conducted with nine intentionally selected health care providers of different categories with experience of more than five years: four nurses, two of them being senior nurses with a clinical experience of greater than twenty years while the other two were with 15 years of experience, three doctors with an experience of ten years and above and two laboratory technicians with six and twenty five years of service. The conducted interviews, in addition to scrutinizing the questionnaire it also revealed that health care providers are lacking sufficient personal protective equipments, lack in-service refreshing training to up date themselves with the current infection prevention methods and high load of patients that prevents them from properly applying the principles of Universal Precautions



The responses of the health care providers to the question guides were summarized under the following four themes.

Theme 1- Health care providers' perception whether they are properly practicing the principles of Universal Precautions or not

All interviewed health care providers feel that they don't always practice the principles of Universal Precautions. The reasons given for not doing so were;

- There was no continuous supply of personal protective materials such as gown, goggles, gloves, masks and boots in the hospital.
- They don't have written Universal Precautions guidelines to follow,
- No reliable water supply to wash hands before and after patient care.
- Lack of hand washing facilities and supplies such as soap, disinfectants and towel that discourages them to wash frequently.

In addition to the above mentioned reasons, some respondents also disclosed the weakness on their part as to why they were not appropriately following the principles of Universal Precautions. These include: negligence, trying to maintain patient's psychology and selecting patients who do not demand precautions because they believed that a particular patient was low-risk.

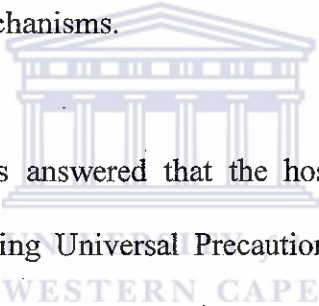
Occasionally health care providers will be challenged in life and death situations where they will be forced to decide that patient's need comes first. One health care provider described why she didn't appropriately practice the recommendation of Universal Precautions in one situation while she was in the maternity ward as:

“I got up the mother who delivered few hours back out of her bed and blood began gushing everywhere—down her legs all over the floor and I could not let go of her to get gloves on. Patient safety took priority over my safety.”

These descriptions suggest that time was of the essence. So the health care provider was convinced that taking a few seconds to follow precautions would have endangered the patient's safety.

Theme 2-Evaluation of how supportive the hospital administration was in practicing Universal Precautions.

Half of the respondents said that the hospital administration is working on improving the proper UP practice by employing new sanitarians who make sure the cleanliness of the wards, delivering safety boxes to each department and follow up waste disposal mechanisms.



But half of the respondents answered that the hospital administration is not supportive at all for practicing Universal Precautions properly for reasons not allocating enough budget for purchasing sufficient UP supplies rather than relying on donations that may or may not come, being reluctant on finding the cause and solutions for the frequent interruption of water supply and not employing enough health man power that could have alleviated the work load on the practicing health care providers and allowing them some time to apply the principles of Universal Precautions while they were caring for their patient.

One nurse said,

“If there is no improvement, I may leave the hospital for fear of being infected with HIV due to poor infection prevention efforts by the hospital”.

Theme 3- Presence of any barriers for implementing the principles of Universal Precautions.

The majority of respondents (85%) replied to the question designed to assess the presence of any barriers for implementing appropriate UP practice as lack of continuous supply of personal protective material, increasing patient load, insufficient safety boxes and unreliable water supply, as the main barriers for not implementing proper UP practice. One senior respondent said:

“I am afraid, what will happen when we finish the donated safety box we currently have?”

This shows that there is no reliable continuous supply of UP equipments in the hospital to appropriately follow the principles of Universal Precautions.

Theme 4- Suggestions given by respondents for improving the proper practice of Universal Precautions in the hospital

All respondents suggested the following to improve the proper Universal Precautions practice in the hospital;

- Increase the level of UP awareness by producing more posters and developing a proper guideline on UP.
- Provision of continuous supply of personal protective materials.
- Secure reliable water supply.
- Employ more health care workers to balance the increasing patient load.
- Increase the number of sanitarians and trained cleaners.
- Giving a regular refreshing on job training to increase health care worker's knowledge level on UP that will definitely enhance the practice level and establishing a continuous monitoring and evaluation mechanism.

One respondent raised a very critical issue that:

“...in most of the undergraduate curriculum, the concept of Universal Precautions was not incorporated as one means of infection prevention method, so incorporating the principles of UP in the training curriculum will improve the proper practice of UP in the future graduates...”

Generally there were several categories of poor compliance towards the application of acceptable UP practice that would require institutional solutions. For example, workers reported that needed safety equipment was either not available or did not function properly, unreliable water supply and lack of

refreshing training. They also noted that excessive patient care responsibilities did not allow sufficient time for them to follow recommendations completely.

However, all respondent health care providers had the intention to follow Universal Precautions and would do so if they are provided with the appropriate equipment or given a reasonable workload that would allow them to follow their intentions.

The response given by the department heads were also summarized under five different themes and presented as follows.



Theme 1- Perception of department heads about the practice of health care workers working under them towards the principles of Universal Precautions for infection prevention.

Most of the respondents do not think that their staffs appropriately implement the principles of Universal Precautions in their daily practice. The reasons given for not having appropriate UP practice included; lack sufficient personal protective materials, lack of time due to high load of patients especially when the ward was occupied to its full capacity , lack of regularly available running water and hand washing supplies. These were mainly due to the shortage of the hospital budget,

but in rare cases psychosocial problems of few health care providers resulting in lack of commitment and some degree of negligence despite good knowledge and well perceived risk of acquiring infection were among the reasons for not complying towards the recommendations of Universal Precautions.

This will tell us how the attitude of health care providers influence the appropriate practice of UP.

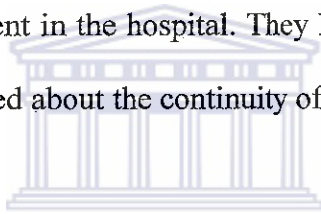
Theme 2-Regarding the way how the health care system was organized in order to ensure the practice of Universal Precautions

Large proportions (75%) of the respondents are not comfortable with the organization of the health care system i.e. it didn't ensure appropriate Universal Precautions practice as there was no well established standard operational procedure to enforce and monitor different components of standard precautions.

The remaining 25% of respondents, though they are not totally comfortable with the way the health care system is organized, they are seeing some changes over the past one year that refreshing trainings on Universal Precautions were given for the first time in the hospital, a committee was established to ensure infection prevention and new staffs on infection prevention were employed including trained nurses and sanitarians.

Theme 3- The availability of sufficient Universal Precautions supplies to maintain appropriate UP practice in the hospital.

Almost all respondents agree on the fact that there was an extreme shortage of personal protective materials. They have already started requesting patients to buy gloves for their own care. In some cases health care providers were taking risks in helping their patient with their bare hand if the patients didn't afford to buy their medical supplies. The goggles and mask which they got through donation were out of stock and they have started to cover their mouth and nose with simple gauze. None of them have seen water proof boot being availed to health care workers since their assignment in the hospital. They have got few donated safety box remaining and are worried about the continuity of supply.



Theme 4- Regarding the presence and frequency of refreshing training on Universal Precautions for staffs.

All respondents revealed that one refreshing training on UP was given last year in collaboration with NGO'S like JHPIEGO and JSI. The frequency of refreshing training depends on the availability of funds from the above mentioned NGO'S and other partners as there was no allocated budget in the hospital for this specific training.

Theme 5- The department head's view towards the policy and strategic direction of Ministry of Health and Regional Health Bureau on Universal Precautions.

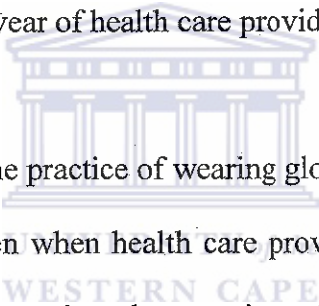
Almost all of the respondents acknowledged the positive strategic direction and policy of the higher health governing bodies towards the appropriate practice of Universal Precautions in the hospital but it is not well supported with sufficient budget for procurement of personal protective materials, waste disposal safety boxes and lacks regular monitoring and evaluation of the infection prevention unit.

6-Discussion and limitations

From the data collected in this study it would appear that the participants had adequate knowledge of the risks of transmission of blood-borne diseases such as HIV, HBV and HCV. About 75% of the respondents have acceptable knowledge on Universal Precautions, while 25% were found to have a poor or unacceptable knowledge concerning Universal Precautions. The physicians, however, were better informed as compared to other groups. The over all practice level in this study is sub-optimal, which is similar to other studies done by Mangion and Becker *et al.* that showed 65.4% of respondents were having an acceptable UP practice. (Mangione *et al.*, 1991 & Becker *et al.*, 1990). Though the mean practice score of doctors was relatively lower than the other professions, majority

of them appropriately practice Universal Precautions. The reason for the lower mean practice score of doctors was due to the fact that there were some doctors with a very low practice score that has decreased the mean practice score.

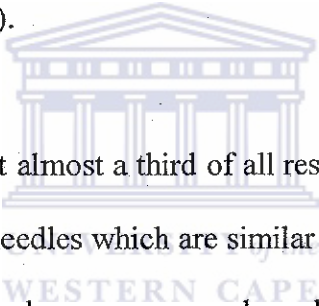
Analysis using Pearson Chi-Square revealed that there was a strong relationship ($P=0.005$) between over all UP knowledge and practice level of health care providers but no significant relation was found between the types of profession and practice level unlike the study done by Gershon *et al.* (1991) that revealed doctors had a poor UP practice level. No significant relationship was noticed between gender and service year of health care providers with their practice level.



A high compliance rate on the practice of wearing gloves 85.5% and utilization of gown/apron 60.6% were seen when health care providers were exposed to deep body fluids or blood products but the practice of using facemasks and eye shields/goggles is very low. Only 37.5% answered they 'always' wear face masks while as low as 30.8% answered they 'always' use eye shields/goggles when they were exposed to deep body fluids or blood products and 44.2% never recap used needles after giving an injection . This finding is relatively better to the study done in India to assess HIV related knowledge among nurses, student nurses, doctors and lab workers during 2002 in seven rural hospitals that revealed the compliance with UP being 67.6% wore gloves, 53.9% wore gown/apron in

procedures whenever there was a possibility of blood or other body fluids splashing and 60.2% did not recap needles (Kermode, 2004). But in developed countries such as United States, the practice of UP even in community hospitals is considerably higher as compared to our setting: glove use: 94%; disposal of sharps: 92%, wearing protective clothing: 55%; not recapping needles 56% (Michalsen *et al.*, 1997).

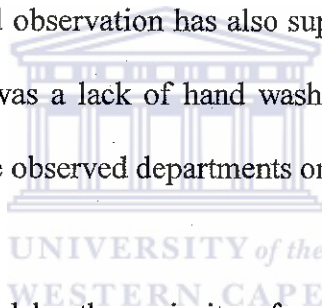
The Canada national survey conducted in 1995 also revealed that Canadian dentists reported routine use of gloves (95%), masks (82%), protective eye wear (82%) when splatter is expected that indicates a higher practice level as compared to our study (McCarthy *et al.*, 1995).



This study also indicated that almost a third of all respondents 34.6% admitted to have always recapped used needles which are similar to the study done in Nigeria where 31.9% of respondents always recap used needles after giving an injection (Wilson *et al.*, 2003). This demonstrates that there is a high risk of needle stick injury in both study population.

Regarding hand washing the study revealed a good practice, 96.2% wash hand after handling objects that might be contaminated with blood or mucous membranes which is again similar to the study done in Nigeria among 433 respondents where 94.6% of health care workers regularly hand wash after

contact with body fluids and handling patients (Wilson *et al.*, 2003). The reason given by those respondents who didn't regularly wash hands in both studies were: inadequate supplies for hand wash, high load of patients, inaccessibility of sinks and no reliable running water which is similar to the study done by Pittet *et al.* (1999) but different from other studies by Larson *et al.* and Zimakoff *et al.* (1992) that have shown health care providers perceived factors that deter them practicing hand washing was mainly due to skin irritation or dryness of the skin, inconvenient location of sinks, lack of institutional guidelines, lack of knowledge or experience, lack of a role model and lack of rewards. The key informant interview and the conducted observation has also supported the reasons given by the respondents that there was a lack of hand washing supplies and absence of running water in some of the observed departments on the day of observation.



A good practice was noticed by the majority of respondents in disposing used needles into a puncture resistant waste disposal container after injection and observation also confirmed the 100% availability and utilization of safety boxes in all departments though their condition during data collection revealed inappropriate utilization, a third of them were overfilled, 14.3% were torn and needles were seen through the hole exposing health care providers for possible infection. This finding suggests that improvement is necessary in decreasing practices associated with possible cross infection from articles to persons.

Observation of the different departments revealed the absence of any poster or Universal Precautions guidelines to be followed by health care providers and half of the departments were found to be unclean. In most of the departments 9/14 there were contaminated needles and sharps in places where they could expose health care providers to needle stick injury. Concerning disposal of wastes there was a good practice of separating waste by type, availability of safety boxes and fully functional incinerator for eliminating solid medical waste.

A post exposure prophylaxis (PEP) kit with guideline on how to use was centrally available but observation of documents revealed that since last September only six health care providers, two of them from the study sample, reported exposure to a proven case of HIV and took PEP. The reasons why only two health care providers from the study sample reported exposure and took PEP despite the large number of exposure reported was either their exposure was with a proven HIV negative person or they didn't report because they might be afraid of being screened for HIV before the PEP. However this has to be further investigated.

Noncompliance is determined by a range of factors including lack of knowledge, (Michalsen *et al.*, 1997 & Gershon *et al.*, 1995), risk perception (Gershon *et al.*, 1995 & Henry *et al.*, 1992), not wanting to offend patients (Gershon *et al.*, 1995), lack of equipment (Henry *et al.*, 1992 & Nelsing *et al.*, 1997), and lack

of time (Kelen *et al.*,1992), uncomfortable personal protective equipment (Kelen *et al.*,1990), inconvenience (Nelsing *et al.*, 1997), work stress (Gershon *et al.*, 1995), and perceiving a weak organizational commitment to safety climate (Michalsen *et al.*, 1997& Gershon *et al.*, 1995). In our setting, both the conducted interview and the statistical analysis of the quantitative data showed lack of knowledge, lack of in-service training), and unavailability of personal protective equipment in the hospital to have been the major determinants for non-compliance.

Unlike other previous studies done by Turner (1993), Gruber *et al.* (1989), and Talan and Baraff (1990) where there was no relationship between knowledge of Universal Precautions and compliance with UP, the current study however showed that there is a strong relationship ($P=0.005$) between over all UP knowledge with practice level of health care providers which is supported by a similar study done in two university hospitals in Mazandaran Province Islamic Republic of Iran (Motamed *et al.*, 2004).

The key informant interview also found out that health care providers think that they lack knowledge on Universal Precautions because they didn't get enough in-service refreshing training on UP and this could have an impact on their practice level as confirmed by the Chi Square analysis that lack of knowledge is associated with poor practice. The absence of posters and guidelines on Universal

precautions was proved by the observation conducted in all departments and this could also be another reason for lack of knowledge on UP which ultimately led to poor compliance towards Universal Precautions.

The key informant interview also revealed that the most common reasons why the respondents in the study didn't comply with the principles of Universal Precautions was lack of protective barriers and lack of continuous in-service training. Indeed, others have indicated that the principal reasons for failure to comply with universal precautions were the absence of well established standard operational procedure to enforce and monitor different components of standard precaution. The lack of Universal Precautions guidelines and remainder posters, unreliable water supply to wash hands, lack of hand washing facilities and supplies such as soap, disinfectants and towel, forgetfulness and time constraints were also raised by the respondents as main reasons for poor compliance.

The key informant interview also confirmed that attitudes are also an important element in changing behaviours of health care providers towards the appropriate practice of UP which is also supported by other studies (Van Wissen, 1993; Steele and Melby, 1995; Walsh, 1992; Turner, 1993).

Wilson and Breedon (1990) also suggested that increased knowledge alone is

insufficient for better compliance and argue that this must be accompanied by changing attitudes and beliefs, a concept supported by Steele and Melby (1995) who infer that attitudes play an important part in changing practice. In reality, the attitudes and beliefs of healthcare practitioners could prove to be a significant barrier to compliance, and strategies need to be directed at influencing not only levels of knowledge but a person's mindset about Universal Precautions (DeJoy *et al.*, 2000). It is evident that further research needs to be undertaken to suggest ways in which these concepts can be changed and knowledge used to re-enforce the significance of universal precautions within the clinical practice settings, thus improving compliance.

It is possible that the Occupational Safety and Health Administration (OSHA) law mandating Universal Precautions, as well as increasing knowledge about occupationally acquired illnesses and attitude of health care providers towards UP improves the compliance in our study (Kelen *et al.*, 1990).

Limitations

-Sample size in quantitative studies depends on the assumptions used namely proportion, level of significance and precision. Although proportion of 50% was used to increase the sample size, the precision used was 10% with lower sample size. Had a higher level of precision like 5% been considered, it would have increased the sample size and validity of the study.

-The fact that I took all the three groups of different health care providers together to derive the sample size but included all the laboratory technicians in the study to ensure their representation made this study unable to really compare between doctors, nurses and laboratory technicians as the sample size of the previous two groups was too small to allow statistically meaningful comparisons. To do so, the sample of doctors and nurses interviewed should have been increased such as 100 doctors and 100 nurses.

-In the Key informant interview the presence of the interviewer might have influenced the response and it is difficult to achieve pure objectivity meaning that the expected beliefs of the researcher might have influenced the response.

- During observation, there could be some inter observer bias.

Another limitation of this study was the method for assessing the practice of infection control measures among health care providers. It was not possible to observe the study participants while practicing for ethical reasons. Results were solely based on their recall and self reported practice. Therefore it is possible to assume that the level of practice could be even lower than reported.

7-Conclusion and recommendations

As the risk for exposure and potential infection with disease continues for health care workers, it is essential that they take measures to protect themselves. Despite acceptable knowledge regarding the potential for infection and mechanisms to prevent these infections, this study has found out that health care workers are not as compliant with universal precautions as they need to be. Therefore a regular on the job refreshing training program on Universal Precautions will help in the retention of knowledge, attitudes and practices among the various categories of health care workers. Further education regarding Universal Precautions and strict observation for compliance will help in better adherence to barrier protection, hand washing, sterilization and proper waste disposal techniques.

Generally the following recommendations are made in order to improve the compliance with Universal Precautions among health care providers in Tikur Anbessa Central Referral Hospital:

- A written guideline and reminder poster on Universal Precautions should always be available in every department to remind health care providers of the need to comply with Universal Precautions.
- The Personal protective equipments should always be made available by the hospital authority and attempts should be made by the hospital to allocate budget for UP trainings and supplies.

- A written plan of the use of personal protective equipments should be posted in all departments of the hospital, especially at the delivery and surgical rooms.
- The practice of recapping used needles should be prohibited in the healthcare facilities in line with the Occupational Safety and Health Administration (OSHA) guidelines (OSHA, 1991).
- Patients should not be allowed to keep their used medical supplies by their bed side for possible reuse.
- Sharps disposal safety boxes should be discarded only when they reach around $\frac{3}{4}$ full as the guidelines suggested and should not be used until full.
- The hospital should strengthen the post exposure prophylaxis program for the protection of health care providers who experience needle stick injuries or splashes.
- Above all, the hospital should organize an ongoing mandatory on-job refreshing training on Universal Precautions to all health care providers with a view to improve overall safety of patients and healthcare providers.
- A regular system of monitoring occupational exposure rates as well as dissemination of the data in order to form a link between the management and the health care providers and thus help in implementing and improving strategies for prevention of blood borne infections by following the principles of Universal Precautions.

-Since the hospital is a teaching institution, incorporating the principles of Universal Precaution in the undergraduate training curriculum should be strengthened in order to improve the proper practice of Universal Precautions by the newly graduating health professionals.



8-References

Becker, MH., Janz, HK., Band, J., Bartley, J., Snyder, MB. & Gaynes, RP. (1990). Noncompliance with universal precautions: Why do physicians and nurses recap needles?, *Am J Infect Control*, 18:232–239.

Beeckmann, SE. (1994). Temporal association between implementation of universal precautions and a sustained, progressive decrease in percutaneous exposures to blood. *Clinical infectious diseases*, 15:243-52.

Blake, S.M., Windsor, R.A., Lohrmann, D.K., Gay, N., Ledsky, R., Richman, A., Jones, S.B., Banspach, S.W. (1999). Factors associated with occupational exposure and complication with universal precaution in an urban school district. *Health Education and Behaviour*, 26: 5, 734–750.

Centers for Disease Control and Prevention [CDC] (1989). Guidelines for prevention of transmission of human immunodeficiency virus and hepatitis B virus to health-care and public-safety workers. *Morb Mortal Wkly Rep*: 38(suppl S6):1–37.

Centers for Diseases Control and Prevention. (1993). *HIV/AIDS surveillance report*.

Centers for Disease Control and Prevention. (1987). Recommendations for prevention of HIV transmission in health-care settings. *Morb Mortal Wkly Rep.*:36(2S):1S–18S.

Chin, JE. (2000). *Control of communicable disease manual*. Washington: American Public Health Association.

DeJoy, D.M., Searcy, C.A., Murphy, L.R. & Gershon, R.R. (2000). Behavioural–diagnostic analysis of compliance with universal precautions among nurses. *Journal of Occupational Health Psychology* 5:1, 127–141.

Demessie, A. & Assefa, T. (2000). A survey of health workers' compliance with universal precautions in Jimma Hospital. Jimma: *Ethiopia J Health Sci*, 10(1): 25-36

Federal MOH (2007). *Guideline for management of opportunistic infections and antiretroviral treatment in adolescent and adults in Ethiopia*. Addis Ababa: Federal HIV/AIDS prevention and control office.

Fox. (2003). Glossary of epidemiological terms. *The Internet Journal of Pediatrics and Neonatology*, 3 (1).

Gershon, R., Vlahov, D., Felknor, SA., Vesley, D., Johnson, PC., Delcios, GL., Murphy, LR. (1995). Compliance with universal precautions among health care workers at three regional hospitals. *American Journal of Infection Control*. 23:225–236.

Gershon, RM., Karkashian, CD., Grosch, JW., *et al.*. (2000). Hospital safety climate and its relationship with safe work practices and workplace exposure incidents. *Am J Infect Control* 28:211-21. ([PubMed](#))

Green-McKenzie, J. (2001). Infection control practices among correctional healthcare. *Journal of Research in Nursing*, 10(5): 544.

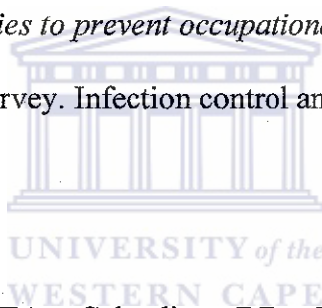
Gruber, M., Beavers, F.E., Johnson, B. (1989). The relationship between knowledge about acquired immunodeficiency syndrome and the implementation of universal precautions by registered nurses. *Clinical Nurse Specialist* 3:182–85.

Gould, D., Wilson, J., Ream, E. (1996). Nurses' infection control practice: hand decontamination, the use of gloves and sharp instruments. *International Journal of nursing studies*, 33(2): 143–60.

Haiduven, DJ., DeMaio, TM., Stevens, DA. (1992). A five-year study of needlestick injuries: significant reduction associated with communication, education, and convenient placement of sharps containers. *Infect Control Hosp Epidemiol*: 13:265–271. [[PubMed](#)]

Hdges, B. (1978) Ch 4- Sampling. In Hoinville, G. & Jowell, R. (eds). *Survey Research Practice*. London: Heinemann: 55-89

Hersey, JC. & Martin, LS. (1994). *Use of infection control guidelines by workers in healthcare facilities to prevent occupational transmission of HBV and HIV*. Results of a national survey. *Infection control and hospital epidemiology*, 15:243–52.

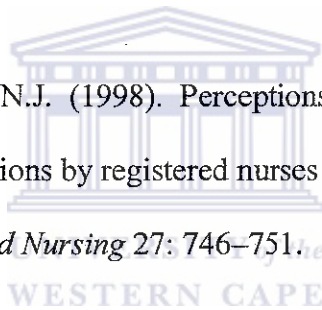


Kelen, GD., DiGiovanna, TA., Celandine, DD., Kalainov, D., Bassoon, L., Junkins, E., Stein, A., Lofy, L., Scott, CR., Sivertson, KT. (1990). Adherence to Universal (barrier) Precautions during interventions on critically ill and injured emergency department patients. *J Acquir Immune Defic Syndr*. 3:987–994. [[PubMed](#)]

Kermode, M. (2002). Unsafe injections in low-income country health settings: need for injection safety promotion to prevent the spread of blood-borne viruses. *Health Promotion Int.* 19:95–103. doi: 10.1093/heapro/dah110. [[PubMed](#)]

Khuri-Bulos, NA., Toukan, A., Mahafzah, A., Al Adham, M., Faori, I., Abu Khader, I., Abu Rumeileh, ZI. (1997). Epidemiology of needlestick and sharp injuries at a university hospital in a developing country: a 3-year prospective study at the Jordan University Hospital, 1993 through 1995. *Am J Infect Control*: 25:322–329. doi: 10.1016/S0196-6553(97)90024-9. [[PubMed](#)]

Knight, V.M., Bodsworth, N.J. (1998). Perceptions and practice of universal blood and body fluid precautions by registered nurses at a major Sydney teaching hospital. *Journal of Advanced Nursing* 27: 746–751.



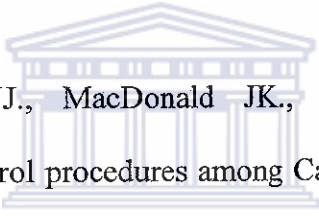
Kotwal, A., Priya, R., Thakur, R., Gupta, V., Kotwal, J., Seth, T. (2004). Injection practices in a metropolis of North India: perceptions, determinants and issues of safety. *Indian J Med Sci.*:58:334–344. [[PubMed](#)]

Larson, E., Killien, M. (1982). Factors influencing hand washing behavior of patient care personnel. *Am J Infect Control* 1982:10:93-9.

Lincoln, Y., Guba, E., (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage.

Lymer, UB., Schutz, AA., Isaksson, B. (1997). A descriptive study of blood exposure incidents among healthcare workers in a university hospital in Sweden. *Journal of hospital infection*, 35:223–5.

Mangione, CM., Gerberding, JL. and S. Cummings. (1991). Occupational exposure to HIV: frequency and rates of underreporting of percutaneous and mucocutaneous exposures by medical housestaff, *Am J Med* 90: 85–90.

McCarthy GM., Koval JJ., MacDonald JK., (1999). Compliance with recommended infection control procedures among Canadian dentists: results of a national survey. *Am J Infection Control*, 27:377-84.


WESTERN CAPE

Michalsen, A. Delclos, GL., Felknor, SA., Davidson, AL., Johnson, PC., Vesley, D., Murphy, LR., Kelen, GD., Gershon, RR. (1997). Compliance with universal precautions among physicians. *J Occup Environ Med.* 39:130–137. doi: 10.1097/00043764-199702000-00010. [[PubMed](#)]

Miller, BF. (1997). *Miller-Keane encyclopedia & dictionary of medicine, nursing & allied health* (6th ed.). Philadelphia: W.B. Saunders.

Motamed, N., BabaMahmoodi, F., Khalilian, A., Peykanheirati, M., Nozari, M. (2004). *Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province*. University of Medical Sciences Iran.

Mukti, A.G., Treloar, C., Suprawimbarti, A.A.H., D'Este, K., Higginbotham, N., Heller, R. (2000). A Universal Precautions Education Intervention for Health Workers in Sarjito and PKU hospital. Indonesia. *Southeast Asian Journal of Tropical Medicine and Public Health* 31:20, 405–411.

Nelsing, S., Nielsen, TL., Nielsen, JO. (1997). *Noncompliance with universal precautions and the associated risk of mucocutaneous blood exposure among Danish physicians*. *Infect Control Hosp Epidemiol.* 18:692–698. [PubMed]

OSHA, (1991). *Definitions from the text of OSHA's Blood bore Pathogen Standard 1910.1030*. For more information on the standard, visit OSHA's Web site: www.osha.gov .

Pittet, D., Mourouga, P., Perneger, TV. (1999). Compliance with hand washing in a teaching hospital. *Infection Control Program. Ann Intern Med.*130:126-30.

Priscilla, R., Elizabeth, T., Robinson, and Elizabeth, E. (2005). *Qualitative methods in Public Health: A field guide for applied research*, 1st edition. Jossey Bass.

Pruss-Ustun, 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. doi: 10.1002/ajim.20230. [PubMed]

Saghafi, L., Raselli, P., Francillon, C., Francioli, P. (1992). Exposure to blood during various procedures: results of two surveys before and after the implementation of universal precautions. *Am J Infect Control.*20:53–7. [PubMed]

Steele, A., Melby, V. (1995). Nurse's knowledge and beliefs about AIDS: comparing nurses in hospital, community and hospital settings. *Journal of Advanced Nursing* 22, 879–887.

Talan, D., Barraff, L. (1990). *Effects of education on the use of universal precautions in a university hospital emergency department. Annals of Emergency Medicine* 19:1322–1326.

Turner, JG. (1993). *AIDS related knowledge, attitudes, and risk for HIV infection among nurses*. Annual review of nursing research, 11:205–24.

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

Van Servellen, GM., Lewis, CE., Leake, B (1988). Nurses responses to the AIDS crisis: implications for continuing education programs. *Journal of Continuing Education in Nursing* 19, 4–8.

Van Wissen, K.A., Siebers, R.W.(1993). Nurses attitudes and concerns pertaining to HIV and AIDS. *Journal of Advanced Nursing* 18:912–917.

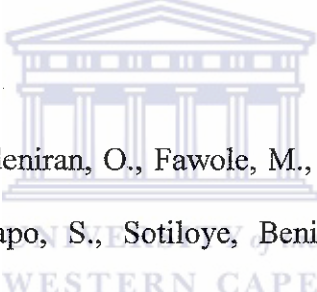
Walsh, G. (1992). AIDS: fear of contagion among nurses. *British Journal of Nursing* 1 (2), 66–71.

Wang, FD., Chen, YY., Liu, CY (2000). Analysis of sharp-edged medical-object injuries at a medical center in Taiwan. *Infect Control Hosp Epidemiol.*: 21:656–658. doi: 10.1086/501710. [PubMed]

Wang, H., Fennie, K., He, G., Burgess, J., Williams, A.B. (2003). A training programme for the prevention of occupational exposure to blood borne pathogens: impact on knowledge, behaviour and incidence of needle stick injuries among student nurses in Changsha, People's Republic of China. *Journal of Advanced Nursing* 41:2, 187–194.

Wears, RL. (1991). *An analysis of emergency physicians cumulative career risk of HIV infection*. *Annals of emergency medicine*, 20:749–53.

Wilson, J., Breedon, P. (1990). Universal Precautions. *Nursing Times* 86:37, 67–70.

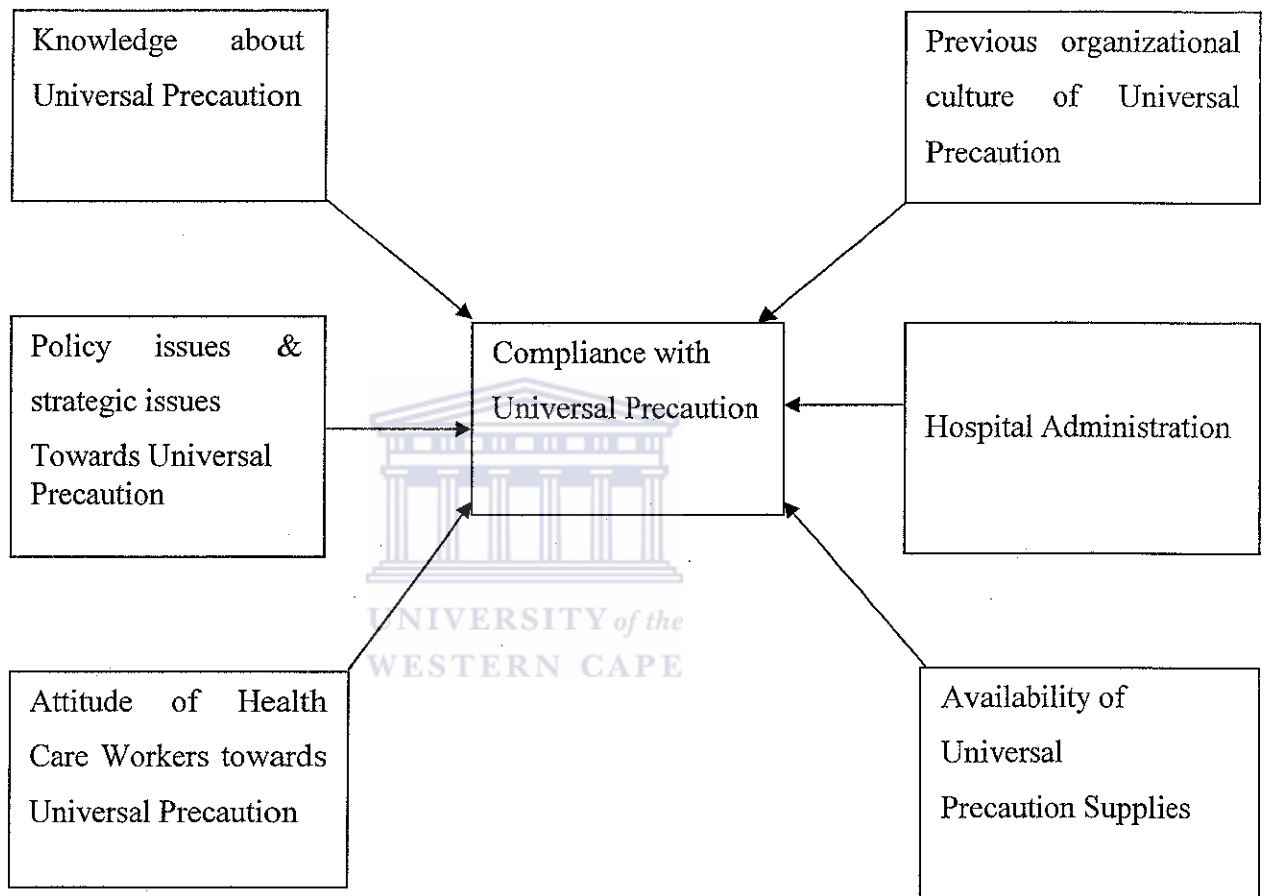


Wilson, E., Sadoh, MD., Adeniran, O., Fawole, M., Ayebo, E., Sadoh, D., Ayo, O., Oladimeji, MD., Oladapo, S., Sotiloye, Benin, M. (2003). *Practice of universal precautions among healthcare workers*. Nigeria.

Zimakoff, J., Kjelsberg, AB., Larsen, SO., Holstein B. (1992). A multicentric questionnaire investigation of attitudes towards hand hygiene, assessed by staff in fifteen hospitals in Denmark and Norway. *Am J Infect Control*. 20:58-64.

9-Appendices

Appendix 1- Problem analysis diagram.



Appendix 2 – Questionnaire to be filled by healthcare providers

Date of interview

Code number of the Questionnaire.....

Section one- Demographical history and work related information. Please circle the appropriate answer(s) in the response column.

No	Questions	Response	Skip to
1	Ageyears	
2	Gender	1. Male 2. Female	
3	Profession	1. Medical Doctor 2. Nurse 3. Midwife nurse 4. Lab. Technician	
4	Year of service after graduationyearsmonths	
5	Department (place of work) in the health institution. (More than one response is possible)	1. General OPD 2. Gynecological ward & Delivery room 3. Surgical ward 4. Emergency OPD 5. Injection or dressing rooms 6. Operation rooms 7. Laboratory 8. ICU 9. Medical ward 10. Pediatric ward 11. Others.....	

Section Two-Work related history, Personal risk perception and Knowledge of UP. Please circle the appropriate answer(s) in the response column.

No	Questions	Response	Skip to
1	Have you ever had any needle stick injury since last year?	1. Yes 2. No.....→	4
2	If the answer is Yes what type of injury did you sustain? (The latest encounter if more than once)	1. Deep injury 2. Slight skin penetration 3. Superficial injury 4. Others (specify).....	
3	How did you sustain the injury? (More than one response is possible)	1. During recapping of needles 2. By a sudden movement of a patient during injection 3. During sharp collection 4. When sharps show up in unexpected places, like bed sheets or other places 5. Other (specify).....	
4	Have you ever had any injury by sharps (scissors, blade etc.) since past year?	1. Yes 2. NO.....→	7
5	If the answer is yes type of injury sustained (The latest encounter if more than once)	1. deep injury 2. slight skin penetration 3. superficial 4. other(specify)	
6	How did you sustain the injury? (More than one response is possible)	1. During working a procedure 2. during cleaning equipments 3. During sharp collection 4. When sharps show up in unexpected places, like bed sheets or other places 5. Other (specify).....	

7	Have you ever been exposed to any blood and /body fluids (with out sharps or needles)	1. Yes 2. No.....→9	
8	What type of exposure (blood/ body fluids) did you have? (The latest encounter if more than once) (More than one response is possible)	1. exposure of blood and body fluids to skin 2. Exposure of blood and body fluids to mucous membranes 3. Splash to the eyes 4. Splash to face and mouth 5. Other (specify).....	
9	Do you know the concept of Standard/ Universal precautions?	1. Yes, I know about it. 2. No, it means nothing to me	
10	Universal Precaution is applied to patients with HIV and HBV only	1. Yes 2. No	
11	Universal Precaution should be applied to all persons regardless of their infection status.	1. Yes 2. No	
12	What are the most common diseases that may be transmitted through contaminated needles and sharps? (More than one response is possible)	1. HBV 2. HCV 3. HIV 4. Other (specify) 5. I don't know	
13	Used needles can be recapped after giving an injection.	1. Yes 2. No	
14	If some one is exposed to HIV through accidental injury, what measures are available to prevent possible disease transmission? (More than one response is possible)	1. Wash immediately with soaps and other antiseptics 2. use medication (PEP) 3. use antibiotics immediately 4. No preventive measures 5. I don't know	
15	Is there any prophylaxis to HIV after exposure to injury by needles or sharps?	1. Yes 2. No 3. I don't know	
16	Isolation is necessary for patients with blood borne infections.	1. Yes 2. No 3. I don't know	

17	Blood spills should be cleaned up promptly with sodium hypochlorite.	1. Yes 2. No 3. I don't know	
18	I assume that blood and all body fluids of patients are infectious	1. Yes 2. No 3. I don't know	
19	Masks, gowns, gloves and goggles are not necessary if procedures and patient-care activities are likely to cause splashing of blood or deep body fluids.	1. Yes 2. No 3. I don't know	

Section Three- Practice in aseptic technique, use of protective barriers, instrument processing & waste disposal and attitude towards UP. Please circle the appropriate answer(s) in the response column.

No	Questions	Response	Skip to
1	Do You wash your hands thoroughly before handling and putting on gloves?	1. Yes 2. No	
2	Do you wash your hands after handling objects that might be contaminated?	1. Yes 2. No	
3	Do you wash your hands after contact with blood or mucous membranes?	1. Yes 2. No	
4	Do you wash your hands after removing gloves?	1. Yes 2. No 3. Washing is not necessary if you use gloves	
5	Do you use antiseptic hand rub (if available) before and after contact with each patient?	1. Yes 2. No	

6	I use a protective eye wear (goggle) if procedures and patient care activities are likely to cause splashing of blood and deep body fluids.	1. Always 2. Sometimes 3. Never	
7	I wear a mask if procedures and patient care activities are likely to cause splashing of blood and deep body fluids.	1. Always 2. Sometimes 3. Never	
8	I wear a gown/apron if procedures and patient care activities are likely to cause splashing of blood and deep body fluids.	1. Always 2. Sometimes 3. Never	
9	I wear a waterproof boot if procedures and patient care activities are likely to cause splashing of blood and deep body fluids.	1. Always 2. Sometimes 3. Never	
10	I wear gloves as the first step in procedures, patient care activities and cleaning surfaces contaminated with blood or other body fluids	1. Always 2. Sometimes 3. Never	
11	I dispose used needles into a puncture resistant waste disposal container after injection.	1. Always 2. Sometimes 3. Never	
12	If I have a wound, I wear gloves or cover the wound with waterproof dressing before caring of patients.	1. Always 2. Sometimes 3. Never	
13	I recap used needles after giving an injection.	1. Always 2. Sometimes 3. Never	
14	What are the reasons for not washing your hands before and after patient care? Multiple answers are possible.	1. Lack of time 2. High load of patients 3. Inaccessibility of sinks 4. Inadequate supplies for hand washing (e.g. hand towels, soap) 5. No running water.	

		6. Concern over the deleterious effects of frequent washing on hands 7. Others Specify.....	
15	In everyday work, prevention guidelines are not always applied. What do you think is the reason? Multiple answers are possible.	1. Lacking knowledge. 2. Forgetfulness. 3. Lack of protective barriers. 4. Lacking time. 5. Patient need comes first. 6. Others (specify).....	
16	Are personal protective equipments and clothing such as masks, goggles, boots, gloves and aprons readily available?	1. Regularly available 2. Irregularly available 3. Not available	
17	Is there a PEP kit available at your hospital	1. Yes 2. No 3. I don't know	
18	Have you received an in-service training on Universal Precaution?	1. Yes 2. No	
	For Nurses, Midwives, and Lab. technicians Only	From Q.19-25	
19	Do you clean instruments and other items before sterilization or HLD?	1. Yes 2. No	
20	Do you sterilize equipments in your assigned place of work	1. Yes No	
21	If the answer is yes what are the means of sterilization in your department. (More than one response is possible)	1. Socked in antiseptic. solution 2. Incinerating 3. Boiling 4. Autoclaving Others, specify).....	

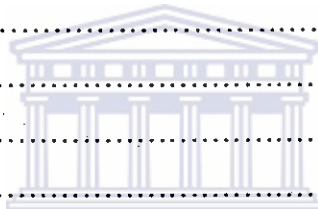
22	Do you have sufficient quantities of puncture resistant waste disposal container in your department?	<ol style="list-style-type: none"> 1. Yes 2. Not sufficient 3. Never 4. I don't know 	
23	Type of needle, syringes and sharp collection box	<ol style="list-style-type: none"> 1. Safety box 2. Liquid proof 3. Open container 4. Puncture proof 5. Others,(specify)..... 	
24	Are needles, syringes, and sharps immediately discarded after use in puncture resistant waste disposal container in your department?	<ol style="list-style-type: none"> 1. Yes 2. No 	
25	How are needles, syringes, and sharps disposed of in your health facility? (More than one response is possible)	<ol style="list-style-type: none"> 1. Open incineration 2. Protected incineration 3. Open dumping 4. Burial in a pit 5. Dumping 6. I don't know 7. Other (specify)..... 	

Appendix 3- Guidelines for Key Informant Interview for Health care workers.

1-Do you think you are properly practicing the principles of Universal Precautions in the hospital? If yes give details.....
.....
.....
.....

If no, give details.....
.....
.....

2-How supportive is the hospital administration in practicing Universal Precaution? Please describe.....
.....
.....



3-Were there any barriers in implementing Universal Precaution? Please describe.....
.....
.....
.....

4-What do you suggest in improving proper practice of Universal Precaution? Please describe.....
.....
.....

Appendix 4- Guidelines for Key Informant Interview for The Medical Director, Department Heads, and Head Nurses in Tikur Anbessa Central Referral Hospital.

1- Do you think health care workers in your facility properly practiced the principles of Universal Precaution for infection prevention? Please describe.....

.....

2-Are you comfortable with the way health care system is organized to ensure the practice of Universal Precaution? Please describe

.....

3- Do you think the Universal Precaution supplies you have are sufficient to maintain Universal Precaution practice in the hospital? Please describe.....

.....

4-Do you give a refreshing training for staffs on Universal Precaution? If so how often and why?.....

.....

5-Please describe your view towards the policy and strategic direction of Ministry of Health and Regional Health Bureau on Universal Precaution.....

.....

.....

Appendix 5- Observation checklist

Date..... Time.....

Department.....Code number of
checklist.....

No	Questions	Answer	Comment
1	Presence of guideline on Universal Precaution	1. Yes 2. No	
2	Presence of posters on Universal Precaution	1. Yes 2. No	
3	How do you rate cleanness of the injection and emergency rooms looks like	1. Clean and no potential contamination of syringes and needle with blood or other body fluids. 2. Not clean and potential contamination of syringes and needle with blood or other body fluids 3. Moderately clean	
4	Are there any contaminated needles and sharps in places where they expose health care workers to needle stick injuries	1. Yes 2. No	
5	Presence of functional running water and hand washing facility.	1. Yes 2. No	
6	How are the instruments or sets sterilized or put ready for use.	1. Socked in antiseptic solution 2. Boiled and packed in clothes	

		3. Autoclaved and packed with clothes Others (specify).....	
7	Is the autoclave/steam sterilizer fully functional?	1. Yes 2. No	
8	Appropriate storage conditions for processed items to maintain sterility or HLD	1. Stored items in a dry location 2. Stored items in wet location 3. Stored items mixed with unsterile equipments 4. Wrapping of storage items in a sterile cloth sealed with TST tape 5. In sterile container with lid that clasps shut	
9	Was date of sterilization documented?	1. Documented 2. Not documented	
10	Presence of disinfectants (sodium hypo chlorite or household bleach).	1. Yes 2. No	
11	Availability of personal protective materials.	1. Goggles, 2. Gloves, 3. Gown /apron 4. Masks.	
12	Handling and disposal of medical waste appropriately	1. Separating waste by type 2. Collecting and transporting waste with in the facility 3. Storing waste with in the unit until it can be disposed of	Yes No 1 2 1 2 1 2

13	Presence of disposal equipment for sharps (needles, blades, and other sharps)	<ol style="list-style-type: none"> 1. Safety box 2. Open container 3. Puncture proof 4. Not available 	
14	Eliminating solid medical waste	<ol style="list-style-type: none"> 1. Burning in an incinerator 2. Open burning 3. Burying 4. Transporting waste to an off-site disposal site 5. Disposed of on the premises 6. Disposed of on pit surrounded by fence. Other (specify)..... 	
15	How was the condition of the collection box during data collection?	<ol style="list-style-type: none"> 1. Over filled 2. Torn and needles seen through the hole 3. Empty or few dirty syringes and needle inside it 4. Other (specify)----- 	
16	Eliminating liquid medical waste	<ol style="list-style-type: none"> 1. Down a sink, drain, or toilet 2. Burying 3. Other (specify)..... 	
17	Adequate disposal of hazardous waste (used bandage, cotton, contaminated waste etc...)	<ol style="list-style-type: none"> 1. Burning in an incinerator 2. Open burning 3. Burying 4. Transporting waste to a temporary disposal site in the hospital 	

Observer name.....sign.....



UNIVERSITY OF THE WESTERN CAPE
School of Public Health



Private Bag X17 • **BELLVILLE** • 7535 • South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872

Appendix 6

Participant Information Sheet

Dear Participant,

Thank you for your willingness to hear about this research. I am a student at the SOPH, University of the Western Cape. As part of my Masters in Public Health, I am required to do a mini-thesis that will be focusing on infection prevention. I am accountable to Prof. Jon Rohde who is contactable at cell: 27 (0) 83-306-7701 or c/o SOPH Fax: 021 959 2872 or by e-mail at: - jrohde@msh.org . What follows is an explanation of the purpose and process of the study and an outline of your involvement.

Title of Research

Investigating the Compliance with Universal Precaution among health care providers in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia.

Purpose of the study

Studies on compliance with Universal Precaution (UP) among health care providers in Ethiopia are generally lacking despite the fact that several health care worker experiencing occupational exposure to blood borne pathogens. It, therefore, becomes important to assess the level of compliance with Universal Precautions by the various types of health care providers who make direct contact with patients. So this study will measure the knowledge, attitude and practice of health care workers towards Universal Precaution and address the determinant factors for poor compliance.

Description of the study and your involvement

For this study I will use a self-administered questionnaire and face-to- face Interviews about your knowledge, practice and attitude towards UP & conduct observations about the availability and utilization of UP materials.

Confidentiality

Your name will be kept confidential at all times. I shall keep all records of your participation, including a signed consent form which I will need from you should you agree to participate in this research study, locked away at all times and will destroy them after the research is completed.

Voluntary participation and withdrawal

Your participation in this study is entirely voluntary. The fact that you are a participant doesn't mean that you will be obliged to complete the study; you may stop at any time. You may also choose not to answer particular questions that are

asked in the study or decline the use of tape-recorder. If there is anything that you would prefer not to discuss, please feel free to say so.

Benefits and costs

You may not get any direct benefit from this study. However the information we get from your participation in this study may help in identifying how the attitudes and beliefs of health practitioners in Ethiopia can be influenced and changed to reinforce adherence to UP within the clinical practice setting. It will also help to improve compliance, and what specific barriers are influential in affecting how you healthcare practitioners adopt Universal Precautions more effectively in your daily practice. There are no costs for participating in this study other than the time you will spend during the interview.

Informed consent

Your signed consent to participate in this study is required before I proceed to interview you. I have included the consent form with this information sheet so that you will be able to review the consent form and then decide whether you would like to participate in this study or not.

Question

Should you have further questions or wish to know more, I can be contacted with the following address: Dr. Fasil Taye, P.O.Box 33301, Addis Ababa, Ethiopia.

E-Mail: ftaye@uneca.org, fastag2003@yahoo.com

Tel. 251 11 922 70 31, 251 11 654 61 66



UNIVERSITY OF THE WESTERN CAPE

School of Public Health

Private Bag X17 • BELLVILLE • 7535 • South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872



Appendix 7

RECORD OF INFORMED CONSENT TO CONDUCT AN INTERVIEW

Date:

Interviewer: **Fasil Taye Gebreselassie, MD**

UWC Student no: **2706807**

Tel: **251 119 22 7031** Fax: _____

E-mail: **ftaye@uneca.org** and **fastag2003@yahoo.com**

Institution: **United Nations Health Care Centre.**

Interviewee's pseudonym:

Place at which the interview will be conducted: **Tikur Anbessa Central Referral**

Hospital, Addis Ababa, Ethiopia.

Thank you for agreeing to allow me to interview you. What follows is an explanation of the purpose and process of this interview. You are asked to give your consent to me on tape when we meet to conduct the interview.

1. Information about the interviewer

I am Fasil Taye Gebreselassie, a student at the SOPH, University of the Western Cape. As part of my Masters in Public Health, I am required to complete a mini-thesis. I will be focusing on investigating the Compliance with Universal Precaution among health care providers in Tikur Anbessa Central Referral Hospital, Addis Ababa, Ethiopia. I am accountable to Prof Jon Rohde who is contactable at cell: 27 (0) 83-306-7701 or c/o SOPH Fax: 021 959 2872 or by e-mail at: - jrohde@msh.org

Here is some information to explain the purpose and usage of my interview. This information can be exactly the same as in the Participant Information Sheet.

2. Purpose and contents of interview

Studies on compliance with Universal Precaution (UP) among health care providers in Ethiopia are generally lacking despite the fact that several health care worker experiencing occupational exposure to blood borne pathogens. It, therefore, becomes important to assess the level of compliance with Universal

Precautions by the various types of health care providers who make direct contact with patients. So this study will measure the knowledge, practice and attitude of health care workers towards Universal Precaution and address the determinant factors for poor compliance.

3. The interview process

For this study I will use a self-administered questionnaire and face-to-face Interviews about your knowledge, practice and attitude towards UP & conduct observations about the availability and utilization of UP materials.

4. Anonymity of contributors

At all times, I will keep the source of the information confidential and refer to you or your words by a pseudonym or invented name which I would like you to choose. See name above. I shall keep any other records of your participation locked away at all times, and destroy them after the data has been collected.

5. Things that may affect your willingness to participate

The interview may touch on issues which are related to your daily activity in the hospital. If there is anything that you would prefer not to discuss, please feel free to say so. I will not be offended and there will be no negative consequences if you

would prefer not to answer a question. I would appreciate your guidance should I ask anything which you see as intrusive.

6. Agreement

6.1 Interviewee's agreement

I have read the details of the proposed study on the Participant information sheet for this research. I have had the opportunity to ask questions for clarifications and have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to provide information to the researcher(s) on the understanding that my name will not be used without my permission (The information will be used only for this research project and publications arising from this research-project). I understand that I have the right to ask for the tape-recorder to be turned off at any time during the interview(s).

I consent voluntarily to be a participant of this study and understand that I have the right to end the interview at any time, and to decline to answer any particular question(s) that are asked in the study.

6.2 Interviewer's agreement

I shall keep the contents of the above research interview confidential in the sense that the pseudonym noted above will be used in all documents which refer to the

interview. The contents will be used for the purposes referred to above, but may be used for published or unpublished research at a later stage without further consent. Any change from this agreement will be renegotiated with you.

Signed by interviewer: Fasil Taye Gebreselassie

Signed by participant:

Date:

Place:

