

**Compliance with Standard Precautions Practice and
Associated Factors among Health Professionals in
Public Hospital in Bale Zone, southeast Ethiopia**

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Abstract

Background: - Despite that standard precautions are an effective strategy in preventing health professionals from occupational exposure; there is no data available that show standard precautions practice among health professionals and associated factors to the knowledge of the investigator. So the aim of this study was to assess compliance with standard precautions practice among health professionals and factors associated with their practice in Bale zone, south east Ethiopia.

Methods: - An institutional based cross sectional study was done in four public Hospitals in Bale zone from March 01-30/2017. Single population proportion formula was employed to determine the sample size. The data was collected through closed ended self-administered questionnaire which was conducted in local language and observation checklist was used to observe the availability of various components of standard precautions. Epi data version 3.1 was used for data entry and data was exported to SPSS version 20 for analysis. Descriptive statistics, bivariate and multivariable logistic regressions were employed. Ethical clearance was obtained from Institutional review board of Jimma University Institute of Health.

Result: - The respondents of the study were 228 with response rate of 98.7%. According to this study only 91 (39.9%) of health professionals had good compliance with standard precautions practice. The study found out that health professionals who were not trained on standard precaution were 62.0% less likely to complied with standard precautions practice compared to those who were trained on standard precautions [AOR=0.38, 95%CI= 0.2, 0.72] and who had good knowledge on standard precautions were 2.27 times more likely to complied with standard precautions practice when compared to those who had poor knowledge at [AOR=2.28, 95%CI= 1.19, 4.32].

Conclusion: - This study revealed that there was poor compliance with standard precautions practices among the study population in health care setting. Therefore, this required concerted efforts by all concerned organizations and hospital managements to achieve the compliance of health professionals with standard precautions.

Key terms: - Health professionals, compliance with standard precautions, factors, Bale Zone.

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Abbreviations

AIDS	-----	Acquired Immune deficiency Syndrome
AOR	-----	Adjusted Odd Ratio
BSI	-----	Body Substance Isolation
CDC	-----	Communicable Disease Prevention and Control
CI	-----	Confidence Interval
COR	-----	Crude Odd Ratio
HBV	-----	Hepatitis B Virus
HCFs	-----	Health Care Facilities
HCWs	-----	Health Care Workers
HCV	-----	Hepatitis C Virus
HIV	-----	Human Immunodeficiency Virus
HPs	-----	Health professionals
NSI	-----	Needle Stick Injury
OPD	-----	Out Patient Department
PPE	-----	Personal Protective Equipment
SP	-----	Standard Precaution
SPP	-----	Standard Precaution Practice
WHO	-----	World Health Organization

Chapter 1: Introduction

1.1. Background

Standard precautions are meant to reduce the risk of transmission of blood borne and other pathogens from both recognized and unrecognized sources. It is a simple set of effective practices designed to protect health workers and patients from infection with a range of pathogens including blood borne viruses. They are applied universally and used when caring for all patients regardless of diagnosis (1,2). The concept of universal precautions came into being in 1985 as the Acquired Immune Deficiency Syndrome (AIDS) epidemic worldwide raised awareness about the occupational hazard of exposure to blood borne pathogens (3). In 1987, Communicable Disease Prevention and Control (CDC) proposed “universal precautions” originally to protect health care workers from exposure to blood-borne pathogens. In 1996, CDC recommended that universal precautions be renamed standard precautions, which combine the major features of the universal precautions and body substance isolation (BSI). The precautions apply to all body fluids including blood, secretions, and excretions (except sweat) regardless of whether or not they contain visible blood, skin that is not intact, mucous membranes, any unfixed tissue or organ (other than intact skin) from human (living or dead), human immunodeficiency virus (HIV) or hepatitis B virus (HBV) containing culture medium or other solutions (4).

Under the standard precautions, blood and body fluid of all patients are considered potentially infectious for HIV, HBV and other blood-borne pathogens. Occupational exposure to blood can result from percutaneous injury (needle stick or other sharps injury), mucocutaneous injury (splash of blood or other body fluids into the eyes, nose or mouth) or blood contact with non-intact skin. Standard precautions is regarded as an effective means of protecting HCWs, patients, and the public, thus reducing hospital acquired infections (2,5). Standard precautions are designed to prevent health care workers from being exposed to potentially infected blood and body fluid by applying the fundamental principles of infection control, through hand washing, utilization of appropriate protective barriers such as gloves, mask, gown, and eye wear (4,6). In addition, the standard precautions stipulate that Health Care Workers (HCWs) take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices during procedures and disposal (7).

According to cross-sectional study conducted in Nigeria among Nurse, the factors that contribute to occupational illnesses and injuries in Health Care Facilities (HCFs) include negligence and carelessness of health care workers, lack of adequate protective aids and equipment, inadequate number of staff, excessive workload, failure to observe basic safety and hygiene guidelines, and inadequate operational knowledge of modern healthcare equipment (8). Compliance to standard precautions is also low in public health facilities, especially in resource-limited country, thus exposing HCWs to the risk of infection(7).

In Ethiopia, there are a few studies that describe occupational exposures and compliance to Standard Precautions (SPs) among HCWs. Study conducted in Eastern Ethiopia detected that there were suboptimal practices of SPs and behavior that put both patients and HCWs at significant risk of acquiring occupational infections (9). According to studies conducted in Wolaita zone, Southern Ethiopia, among 623 respondents only 42.1% HCW were complied with universal precautions while in the same region, study conducted in Mizan-Aman General Hospital among 135 respondents only 63(46.8%) HCWs practice standard blood and body fluid precautions always (10,11). Therefore this study was assessed Standard precautions practices among the health professionals whose job descriptions entail having direct contacts with patients on an almost daily basis in public Hospital. In this regard, this study was assessed standard precautions practice among health professionals and identifies associated factors in Bale Zone public Hospitals.

1.2. Statements of the problems

Health workers are exposed to blood and other body fluids in the course of their work. Consequently, they are at risk of infection with blood borne viruses including human immunodeficiency virus (HIV), hepatitis B (HBV) and hepatitis C (HCV). Among the 35 million health workers worldwide, about 3 million receive percutaneous exposures to blood borne pathogens each year; two million of those to HBV, 0.9 million to HCV and 170 000 to HIV. These injuries may result in 15 000 HCV, 70 000 HBV and 500 HIV infections. More than 90% of these infections occur in developing countries (2).

Occupational health is a neglected public health issue among healthcare workers in developing countries. The common prevailing occupational health hazard among health care worker in developing countries were blood borne diseases, musculoskeletal problems, latex allergy,

tuberculosis, violence and work-related stress (12) . For instance, study conducted in Uganda found that among 200 respondents 50.0% of them had experienced an occupational health hazard from which 39.5% experienced biological hazards (13). Research conducted in Nigeria revealed that 48.1% of HCW were exposed to blood borne infections (14). Survey conducted among healthcare worker and medical students in University of Gondar Hospital, Northwest Ethiopia revealed that the overall lifetime and one year prevalence's of occupational exposure to blood and body fluid were 177(70.2%) and 158 (62.9%), respectively (15). Study conducted in public Hospitals of Bale Zone, Southeast Ethiopia also found that the prevalence of lifetime needle stick and sharp injury was 37.1% among the respondents (16).

Most blood exposures in health settings are preventable. Strategies to protect health workers include implementation of Standard Precautions, immunization against hepatitis B, provision of personal protective equipment and the management of exposures. Compliance to universal Precautions are a simple set of effective practices designed to protect health workers and patients from infection with a range of pathogens including blood borne viruses. These practices are used when caring for all patients regardless of diagnosis (2). Even though there were no data available that shows compliance of health professionals with standard precaution practice, studies conducted among healthcare workers show that there were poor compliance with standard precautions practice as per recommended on national guidelines. Among these, study conducted in Nigeria found that only 52.1 % of healthcare workers were “always” complied with preventive safety (17). The problem also visible in different part of Ethiopia such as Hawassa town and Wolita Zone, south Ethiopia, only 48.2% and 42.1% of the HCW had complied with universal precautions respectively (10,18). In Mekelle Special Zone, 42.9% of the HCWs had good practice on standard precautions (19). Other survey conducted in Bahir Dar, Northwest Ethiopia also revealed that only 35.3% HCWs were complied with SPs (20). Despite that standard precaution is an effective strategy in preventing health professionals from occupational exposure; there were inadequate data available that shows the compliance of health professionals with standard precautions practice and factors associated and more importantly the recommended components of standard precaution did not well address to the knowledge of the investigator in other study. Beside this fact, there was no study that explores standard precaution practiced among health professionals in other area and in public Hospital in Bale Zone.

1.3. Significance of the study

Public hospitals being place of work need to adhere with basic safety requirements and safety principles in health services provision. Standard precautions are important to prevent health professionals from exposure to blood borne and non-blood borne pathogens while they conduct /perform their daily health services activities in healthcare facilities. However there were inadequate data available that shows the compliance of health professionals towards standard precautions practice as long as the investigator knows. So this study is designed to measure the compliance of health professionals to standard precautions practice and uncover associated factors and more importantly address recommended components of standard precautions that did not well address to the knowledge of the investigator. Thus the finding of the study will inform healthcare facilities planner to give attention to health facilities safety aspect as well as for re-evaluating the potential risk status of health professionals. The finding will also provide opportunities for hospital managements to understand the compliance of health professionals towards the practice of standard precautions and to take necessary steps to manage the associated factors.

Chapter 2: Literature review

Proper infection prevention practices are fundamental to quality of care, and essential to protect healthcare workers, patients, and communities. Particularly in a country such as Ethiopia, where the prevalence of serious infectious diseases such as Hepatitis B and HIV is so high, and preventive interventions for both these diseases are minimal, failure to follow proper infection prevention practices puts healthcare workers, patients and the communities at tremendous risk (21).

Treating all patients in the health care facility with the same basic level of standard precautions involves work practices that are essential to provide a high level of protection to patients, health care workers and visitor (22). Standard Precautions is a group of infection prevention practices that apply to all patients based on the principle that all blood, body fluids secretions, excretions (except sweat), non-intact skin, and mucous membranes may contain transmissible infectious agents regardless of suspected or confirmed diagnosis or presumed infection status (4,11)

Components of the Standard Precautions

Hand hygiene

Hand hygiene is a major component of standard precautions and one of the most effective methods to prevent transmission of pathogens associated with health care and performed before and after any direct patient contact and between patients, whether or not gloves are worn (1,22). However, different survey conducted at different country shows low level of hand hygiene practiced among healthcare workers. For instance Survey conducted in Nigeria revealed that 84.6% of HCW practiced hand washing regularly when handling patients/carrying procedures (23) while in the same country study with regard to the practice of hand hygiene among HCW revealed that, 58.5%, 28.1% and 63.6% always practiced hand hygiene after touching patients, after touching patients' surroundings and after removing gloves, respectively (24). Study conducted in Ethiopia also reported different proportion of hand washing practice. Among them survey done in Wolaita Zone, Southern Ethiopia reported that only 44.1% of HCW practiced hand washing before and after any health care procedure or handling. Other survey done in Mekele special zone shows that only 297(61.5%) HCWs always practice hand washing after any direct contact with patient, 166(34.4%) practice often and the remaining 20(4.1%) practice

seldom (10,19). Additionally study done in Northwest Ethiopia 27.8% and 80.6% of HPs had always practiced hand washing after contact with patient and immediately after removal of glove respectively(25).

Personal Protective Equipment

Personal Protective Equipment (PPE) refers to a variety of barriers used alone or in combination to protect mucous membrane airways, skin and clothing from contact with infectious agents. Using personal protective equipment provides a physical barrier between micro-organisms and the wearer. It offers protection by helping to prevent micro-organisms from contaminating hands, eyes, clothing, hair and shoes. PPE includes gloves, protective eye wear (goggles), mask, apron, gown, boots/shoe covers and cap/hair cover. The use of personal protective equipment should be guided by risk assessment and the extent of contact anticipated with blood and body fluids, or pathogens (4,22). Careful adherence to standard precautions can protect both health care workers (HCWs) and patients from infections. However adherence to PPE is still low. Research done in India found out that use of protective eye gear and outer protective clothing was accounts only 22% and 28%, respectively (26). Survey conducted in tertiary Hospital of Nigeria reported that One hundred and eighty two (87.9%) respondents claimed to wear hand gloves regularly when touching blood, body secretions or mucus membranes. The regular use of face mask when undertaking procedure that could generate splashes of blood or other body fluid was reported by 106 (51.2%) respondents, 67 (32.4%) claimed to always use nose mask when working within 1-2 meters of a patient with cough (27). Other study conducted in Ghana shows that (88%) of respondents indicated that they wore gloves routinely when performing invasive procedures on patients (28). In Nigeria the study revealed that the use of protective materials by the respondents in which 68.75% , 12.50%), 15% and 40% used gloves, mask, goggles and apron always in clinical practice respectively (29). Proportion of using PPE is also reported in Ethiopia such as Mekele special zone in which 86.7%, 89.9% and 10.3% of HCW always practiced glove, gown/plastic apron and mask and goggle during procedures respectively (19). Other survey done in Bahir Dar Town, Northwest Ethiopia reported that 54.25% HCWs wore glove during healthcare procedure (20). Additionally among HCWs participated in survey conducted in Mizanaman 76% wore glove while performing healthcare procedure (11).

Collection and disposal of sharp materials and other waste

The most common form of occupational exposure to blood and the most likely to result in infection is needle-stick injury. The most common causes of needle stick injury are two-handed recapping and the unsafe collection and disposal of sharps waste. Safe collection and disposal of needles (hypodermic and suture) and sharps (scalpel blades, lancets, razors, scissors), with required puncture- and liquid- proof safety boxes in each patient care area is strategies to protect needle stick injury (2). According to Study conducted in Nigeria 80% and 20% of the respondents were dispose used syringe and needles in the safety box and in dust bin respectively(29). Research conducted in different region of Ethiopia shows different proportion regarding to not recapping of used needles among HCWs. For instance in Mekele 79.5% and 92.8% of the HCWs reported that they discard used needle and sharp materials in safety box and dispose waste in the labeled container respectively while 82.4% of HCWs collect needle without recapping it after giving injection or drawing blood from patients (19).

Factors associated with the practice of standard precautions among health professionals

Socio demographic factors

The highest incidence of NSIs was seen in nurses and that the associated factors were age, level of education, number of shifts per month and history of related training (30). According to survey done in Nigeria challenges that prevented the practice of standard precautions as identified by 52.4% study participants were lack of regular training on infection control (24). while sex and year of service were related to knowledge on universal precautions in which female (67.8%) were knowledgeable than male (32.2%) at $p < 0.05$ and those with ten years and above working experience had a high level of awareness of universal precautions than those with below five years ($p < 0.05$) (31) and other study reported that compliance to standard precaution had no statistically significant relationship with gender ($p = 0.84$), duration of employment ($p = 0.11$) and age ($p = 0.73$) (27).

According to Study conducted in Bahir Dar city, North West Ethiopia report; working experience greater than 10 years (AOR= 3.79 (95% CI=2.33, 6.17)) had positive association with the practice of infection prevention (32).

A cross sectional study conducted in Mekele showed that the odd of good standard precautions practice was 2.5 times higher in young age more than HCWs of older age [AOR (95% C.I.)=2.5(1.1, 5.3)]. Odd of good practice was likely to be reduced by 50% among males compared to female [AOR (95% C.I.)=0.5(0.3, 0.8)] while the odd of good practice was likely to be higher by 1.6 times in HCWs trained for standard precautions than those did not take training [AOR (95% C.I.)=1.6(1.0, 2.4)] (19).

Health facility related factors

Health facilities factors include support from facility management, availability of water supply, PPEs, guidelines, and sharp materials containers. However factors related health facilities are different from places to place. According survey conducted in Nigeria among 47.9% of HCWs who did not always comply with standard precautions 41.0% of them were due to lack or inadequacy of safety equipment in the facility (17). Out of the 290 study participants in Nigeria 66.1% and 34.8% of HCWs identified as lack of appropriate or adequate resources and excess workload were the major challenges preventing them from routine practice of standard precautions (26). Study conducted in Uganda revealed that working overtime [COR = 2.44 (1.24–4.78), $P = 0.009$], experiencing job related pressure [COR = 8.35 (2.45–28.4), $P = 0.001$] were associated with exposure to biological hazards (13). Survey done on HCWs in Hawassa, Ethiopia showed that about 83.3 % of the participants reported dissatisfaction by the provision of infection prevention materials, 73 % of whom cited lack of supply (scarcity) as the main reason for not practice standard precautions (18). Study done in Mekele showed that HCWs working in the rooms having written material for risk communication had 1.8 times increase the likelihood of practicing standard precautions than HCWs working in rooms without written material for risk communication [AOR (95% C.I.)=1.8(1.2, 2.8)]. Thus presences of written guideline for the health care workers were predictors of standard precautions practice (19). Other survey done in Arba Minch General Hospital, Southern Ethiopia showed that satisfied with working environment [COR(95% CI):2.1(0.7,6.7) were statistically significantly associated with needle stick and sharp injury exposure in the study area (33). While other study in Bahir Dar showed that availability PPE (AOR= 6.79 (95% CI=2.83, 17.27)) had positive association with infection prevention (32).

Knowledge and attitude of health professionals towards standard precautions

Cross sectional survey conducted in Nigeria revealed that 50.3% of the respondents have good knowledge on standard precautions and having good knowledge on SP was significantly associated with good practice ($p = 0.02$)(27). On the other hand study conducted in the same country reported that majority of the HCWs were able to identify the components of SP in which 81.7%, 80.6%, and 95.2% of HCWs identify hand washing, use of PPEs, safe collection and disposal of sharp material respectively, however only 62% of HCWs used PPE always (24).

According to research done in Mizan-Aman general Hospital, south west Ethiopia among 135 HCW's 59 (43.7%) of them disposed sharp materials such as used needles in open pails, 91 (67.4%) in sharp and liquid proof container without removing syringe, 59 (43.7%) in sharp and liquid proof container after separating the needle from syringe, 42 (31.1%) mixed with other wastes/rubbish and 107 (79.2%) in safety box. Ninety five (70.4%) HCW's knows that gloves and gowns were required for any contact with patients and 82(60.7%) of HCWs claimed that contaminated needle should be recapped immediately after use while more than half of HCWs who participated in the study 84 (62.2%) strongly agree that using glove for all patients care contacts were useful strategy for reducing risk of transmission of organisms (11). Other study conducted in Agaro, south west Ethiopia found that 70 (96%) of the study participants believed that hand washing is the single most effective mechanism to prevent the spread of infection (34).

Health professionals practice of standard precautions and associated factors

Survey conducted in Nigeria revealed that only 52.1 % of HCWs were “always” complied with preventive safety precautions advised in the standard operating procedures (SOPs) and job aids. According to this research the reasons given by the rest of HCWs who did not ‘always’ complied with SPs were lack of, or inadequacy of safety kits/equipment (41.0 %), time compliance (5.9 %) and associated discomfort (17).

According to cross sectional study conducted in selected health facility in Nigeria, general use of PPEs was reported by 81.7% though consistent use was reported by only 63.5% of HCWs. The reason for those who do not use PPEs was non availability of PPEs, not seeing the need and cumbersome to use were the major (24). Similar survey conducted in Nigeria revealed that the median practice of standard precautions score was 50.8%. The reasoned identified was 66.1%,

due to lack of appropriate or adequate resources to practice standard precautions, 52.4% lack of regular training on infection control, 38.9% lack of an infection prevention and control committee and 34.8% excess workload as the major challenges preventing routine practice of standard precautions (26).

In our country Ethiopia studies reported different proportion of standard precautions practice among HCWs in health facilities. For instance, research done in Aman General Hospital, Southwest of Ethiopia reported that among 135 respondent 63 (46.8%) of HCWs practice standard blood and body fluid precautions always at their work place. Some of the reasons for not wearing any of stated personal protective equipment were due to stock out of desired PPE, lack of training on standard precautions, uncomfortable/inconvenient and difficulty to work with PPE (11). Study conducted in Bahir Dar city, North West Ethiopia showed that working experience greater than 10 years (AOR= 3.79 (95% CI=2.33, 6.17)) and availability PPE (AOR= 6.79 (95% CI=2.83, 17.27)) had positive association with the practice of infection prevention (32). Other study conducted in Agaro, south west Ethiopia found that 98.6% of the study participants practiced hand washing before and after individual patient contact and after contact with body secretions from which 88% of them always used soap or other antiseptic solution during hand washing (34).

Institution based cross sectional study done on Standard Precautions Practice among Health Care Workers in public health facilities of Mekelle Special Zone, Northern Ethiopia, showed that less than half of HCWs 42.9% had good practice of standard precautions. The study found that the presence of written guideline and training given for the health care workers were predictors of standard precautions practice (19). According to majority of literatures, practice of standard precautions among HCWs is very low especially in developing country like Ethiopia. Therefore there is a need of focusing on further factors affecting HPs standard precautions practice that can bridge this gap.

2.1. Conceptual framework

A conceptual frame work model for the practice of standard precautions was developed after referring different literatures and guideline of CDC. In fact, many factors were associated with the practice of standard precautions. However, in this conceptual model four major factors were identified and categorized systematically according to their relationships among themselves and

their effect to the practice of SPs. These includes socio-demographic characteristic of health professionals, health facility related factor, knowledge and attitude of health professionals towards SP practice. Important factors were mentioned under each major factor in Figure 1 below.

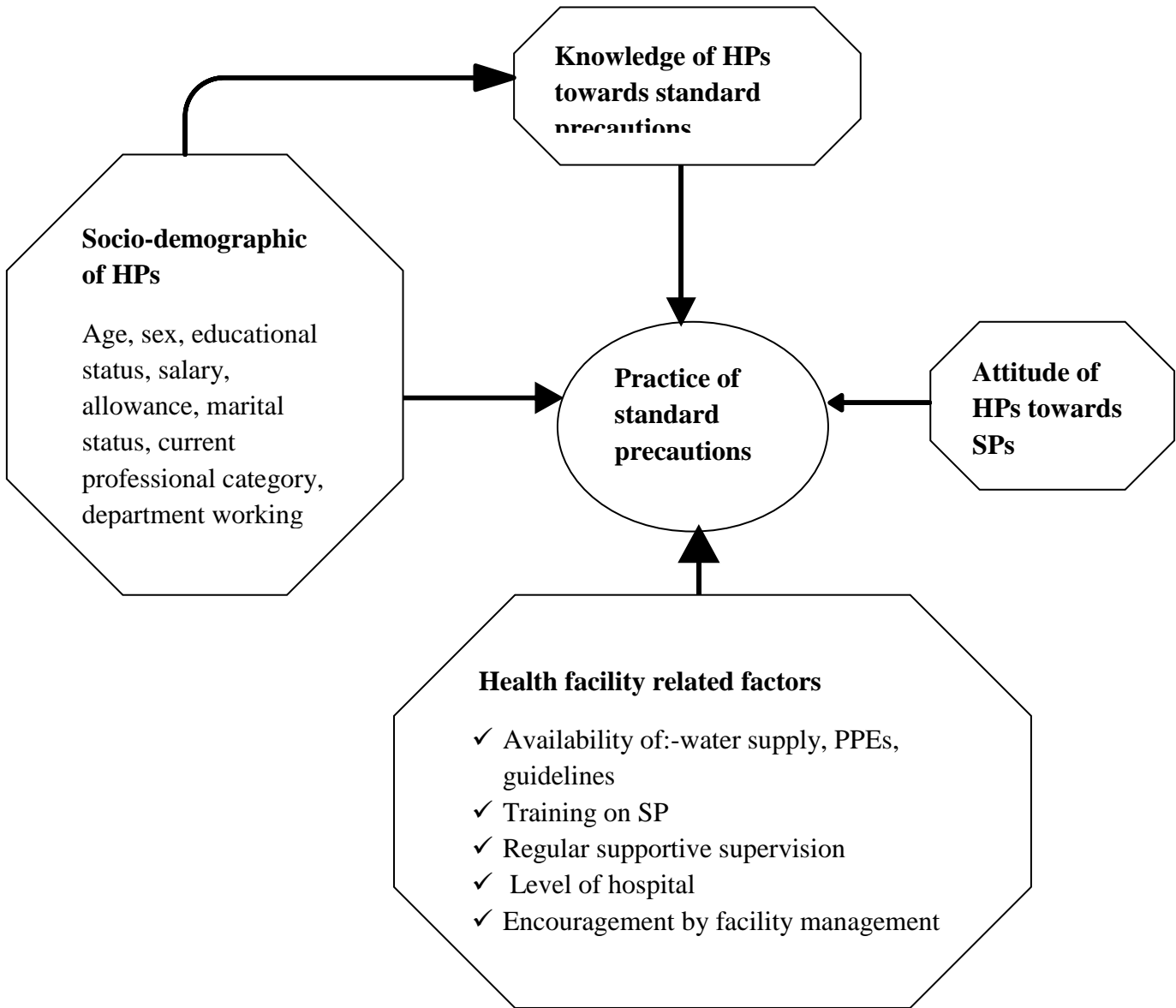


Figure 1: Conceptual framework for Standard Precautions Practice and Associated Factors among Health professionals in Public Hospital of Bale Zone in March 01-30/2017

Source: - Different literatures, WHO infection prevention guideline, 2004 and CDC guidelines, 2007

Chapter 3: Objectives

3.1. General objective

- To assess compliance with standard precautions practice and associated factors among health professionals in public hospitals in Bale Zone, southeast Ethiopia, 2017 G.C.

3.2. Specific objectives

- To assess compliance with standard precautions practice among health professionals.
- To identify factors associated with standard precautions practice among health professionals.

Chapter 4: Methods and Materials

4.1. Study area and periods

The study was conducted in Bale Zone, Oromia regional state, south east Ethiopia from March 01-30/2017. The Zone has 20 woredas and 1 city administration and covers the area of 43,690.56 sq.km. Robe town is being the capital city of the zone which is located 430km away from Addis Ababa. The Zone is bordered on the south by Ganale Dorya River which separate from Guji zone, on the west by the West Arsi Zone, on the north by East Arsi, on the northeast by Shebelle River which separate from West Hararghe and East Hararghe Zones, and on the East by the Somali region.

In the Zone functional public health Facilities are 4 hospitals and 84 health centers. The study was conducted in Goba (referral), Ginnir (general), Bale Robe and Dello Menna (primary) hospitals.

4.2. Study design

Institutional based cross sectional study was conducted.

4.3. Population

4.3.1. Source of population

- All public hospitals in Bale zone and all health professionals working in those hospitals.

4.3.2. Study population

- Public hospitals of Bale zone which includes Goba, Ginnir, Bale Robe and Dello Menna hospitals and health professionals working in these hospitals were sampled.
- All sampled health professionals who were Medical Doctors, Nurses, Midwives, laboratory technologists/technicians and all hospitals were involved in the study.

4.3.3. Inclusion and exclusion criteria

4.3.3.1. Inclusion criteria

- Health professionals who were medical doctors, nurses, midwives and laboratory technologist/technician and currently working in Bale Zone Public Hospital.

4.3.3.2. Exclusion criteria

- Health professionals who were seriously ill, who were on annual leave during data collection time were excluded from the study.
- Health professional who were newly employed within the last 6 month.

4.4. Sample Size and sampling techniques

4.4.1. Sample size determination

Since there were no previous data available for the value of P the sample size was estimated based on the assumption that 50% of health professionals had good standard precautions practiced. Then single population proportion formula with confidence level of 95% and 5% margin of error was employed to determine sample size.

$$n = \frac{(Z / 2)^2 P (1-P)}{d^2} = \frac{(1.96)^2 \times (0.5 (1-0.5))}{(0.05)^2} = 384$$

Where;

n = Sample size.

$Z_{\alpha/2}$ = 95 % confidence (1.96)

P = Proportion of an assumption that 50% of health professionals have good compliance with standard precautions practice.

d = Desired precision (5 %).

Since the total health professionals who were working in those selected hospitals were 464 which is so much smaller than 10,000; the sample size needs to be adjusted by using finite population correction formula.

$$n = \frac{n_0}{\left(1 + \frac{n_0}{N}\right)}$$

$$n = 384 / [1 + 384/464] = 210$$

By considering 10% for potential non-response rate (i.e. 21), the total sample size calculated was 231.

4.4.2. Sampling techniques

The number of health professionals who were working in those selected hospitals was obtained from each Hospital. Then proportional allocation method was used for each levels of hospital. At

each Hospital proportional allocation method was used for each professional category and working department to make the distribution representative. Then simple random sampling was employed at each Hospital to select 231 participants who fulfilled the inclusion criteria from each Hospital. The schematic presentation of the sampling procedure was according to the following diagram.

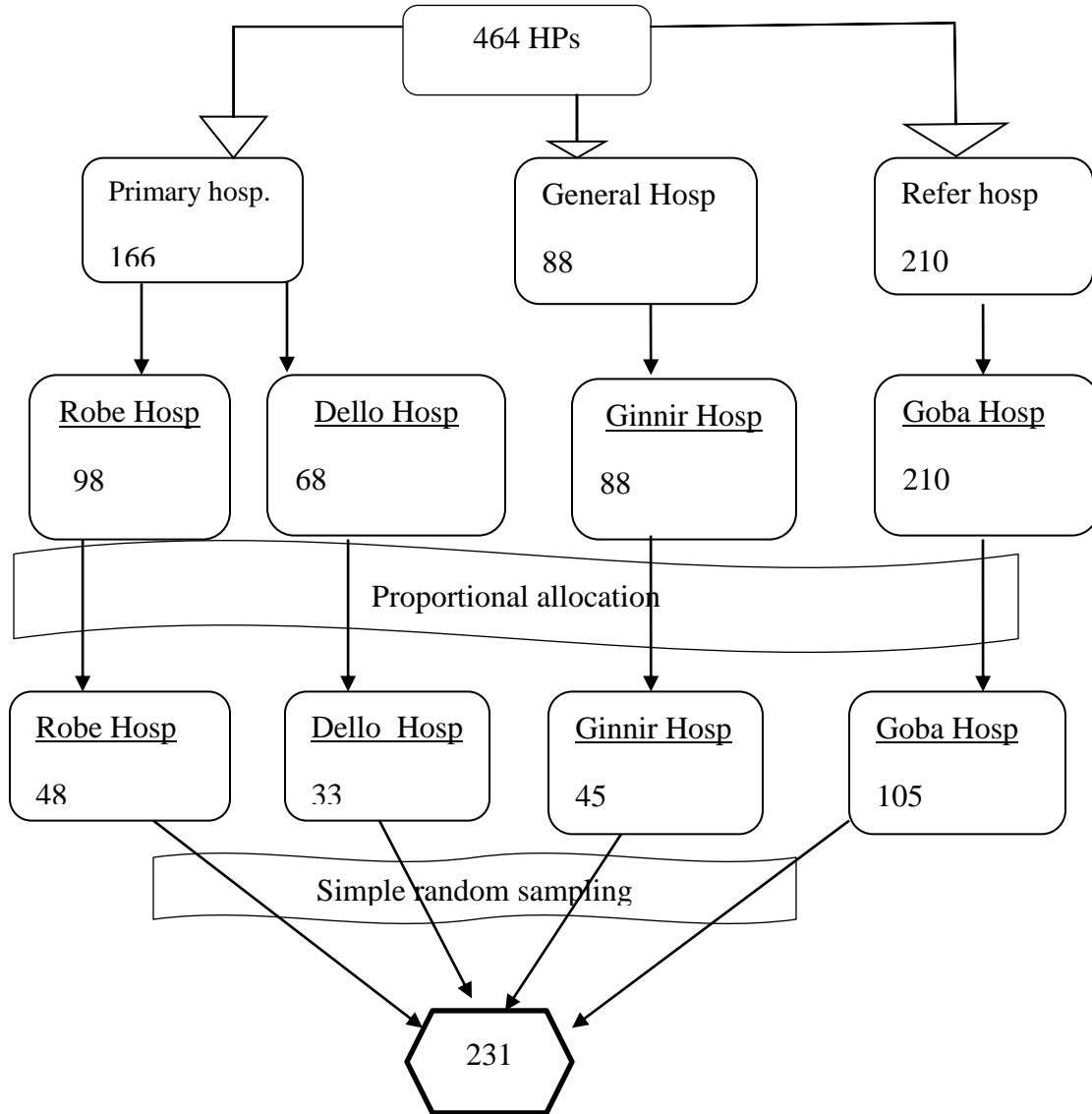


Figure 2: Schematic presentation of sampling technique for the study of standard precautions practice in Bale Zone March 01-30/2017

4.5. Measurements and study variables

4.5.1. Measurements

The following components/elements of standard precautions were considered to measure health professionals practice (1,2,4,19,21,22). For each components health professionals were asked how often he/she practiced and label among the following frequency responses: always, often, seldom and never. The frequency responses ‘always’ and ‘often’ were combined and interpreted as compliance with standard precautions practice while frequency responses ‘seldom’ and ‘never’ were interpreted as not complied with standard precautions practice.

1. Hand washing after any direct contact with patients
2. Hand washing with antiseptic-containing soap and water
3. Hand washing immediately after removing gloves
4. Perform hand rubbing with an alcohol-based preparation.
5. Wearing gloves for contact with body fluids or blood and mucous membranes.
6. Change gloves between contacts with different patients
7. Wearing Mask when there is a splash of blood or body fluids.
8. Wearing goggle when there is a splash of blood or body fluids.
9. Wearing a plastic apron when there is a splash of blood or body fluids.
10. Wearing rubber boots/overshoes when floor is contaminated with spillage.
11. Cleaning reusable medical equipment immediately after use
12. Discard used needle and sharp materials in puncture proof container with international biohazard symbol

4.5.2. Variables

4.5.2.1. *Dependent variable*

Health professionals’ compliance with standard precautions practice

4.5.2.2. *Independent variable*

Socio demographic:-Age, Sex, marital status, service year, salary, risk allowance educational status, professional category, and department s/he was working in.

Knowledge related factors: -Health professionals’ knowledge on standard precautions.

Attitude of health professionals: -Health professionals' attitude towards practice of SP.

Hospital related factors: -Availability of water supply, PPE, guidelines, training on standard precautions practice and compliance monitor through supportive supervision and level of hospital.

4.6. Data Collection instruments and methods

4.6.1. Data collection tools

Data collection tools was adapted from WHO for a strategy to protect health workers and patients from infection with blood borne disease, guidelines for Isolation precautions: Preventing transmission of infectious agents in health care setting 2007 and from reviews of different relevant literatures and variables identified to be measured (1,2,4,21,22). It was composing of socio-demographic questions; knowledge questions concerning standard precaution, questions related to attitude and practices of health professionals towards standard precaution.

The questionnaires for data collection was prepared in English and translated to Afan Oromo and Amharic language back translated to English by language expert to check for its consistency. Finally the corrected Afan Oromo and Amharic version were used to collect the data. Checklist was used for observation of the availability of the major components of standard precautions.

4.6.2. Personnel

Four diploma Nurses were recruited for data collection from health center located in Robe town and three supervisors were recruited based on their previous experiences. Appropriate training was given to data collectors and supervisors on objective, relevance and benefits of the study, confidentiality of information, respondent's right, informed consent for one day. Observation checklist was conducted by principal investigator.

4.6.3. Data collection technique

- A. **Self-administered structured questionnaire:** The data was collected through closed ended self-administered questionnaire which was conducted in Afan Oromo and Amharic language.
- B. **Observation:** - Observation was done by principal investigator prior to distributing the questionnaire to the participants to prevent the contamination of data from

observations. Medical, surgical, pediatrics, maternity wards, operation room, emergency room and dressing rooms; expanded programme immunization (EPI) room, family planning and laboratory units of each hospitals were areas observed for availability of various components of standard precautions. The main observation includes availability of PPE, water supply, rubber boots/overshoes, standard precautions guidelines and standard operating procedures and sharp material containers.

4.7. Operational definition

Practice: - Refers to the level of HPs compliance with standard precaution practice. Standard precautions practice by all HPs was obtained by using self-administered questionnaire. The respondents were asked how often he/she practiced and label among frequency responses: always, often, seldom and never for each component of standard precautions practiced. Where:-

- ❖ Always refers to practice of standard precautions every time without any interruption.
- ❖ Often refers to practice of standard precautions many times.
- ❖ Seldom refers to practice of standard precautions rare times.
- ❖ Never refers to if standard precautions did not practice at any time.

Then compliance with standard precautions practice were computed by giving 1 (practiced) for 'always' and 'often' response, 0 (not practiced) for 'seldom' and 'never' responses. Finally those HPs reported to 'always' and 'often' practiced for greater than and equal to the mean value out of 12 components were considered as good compliance with standard precautions practice while HPs reported practiced to less than the mean value out of 12 components were considered as poor compliance (11,19,35–37).

Knowledge: -Knowledge is refers to having adequate understanding on concept, contents and activities of standard precaution among health professionals. Eight items were used with three possible answers in which score 1 was given for correct answer and score 0 was given for incorrect answer. Respondents who report less than mean value out of twenty four correct answer were considered as poor knowledge and those who report greater than and equal to the mean value were considered as having good knowledge (36,37).

Attitude: -Attitude is a belief and intention to follow the principles of standard precaution by HPs. Ten items were used on Likert's scale using degree of agreement response: strongly

disagree, disagree, neutral, agree and strongly agree to measure the attitude. Then all individual response was computed to obtain total score and calculated for means. Then response greater than and equal to the mean value was considered as positive attitude while responses less than the mean value was considered as negative attitude (11,32,36).

Health Professionals: -In this study health professional includes Medical Doctors, Nurses, Midwives, and laboratory technologists/technicians who had contact with patients, syringes, needles, other sharp materials, blood and body fluids by the virtue of their duties.

Health care facility- Refers to level of hospital and its facilities that influence the compliance of standard precautions practiced. This was measured by five items (4).

4.8. Data Processing and Analysis plan

After data collection, data were checked for completeness, edited, cleaned, coded and then entered to Epi-data 3.1 version and validated in double entry validation. Then data were exported to SPSS version 20 software package for analysis. Then frequency table and charts were used during data analysis and finally result was presented using tables, figures and narratives. Bivariate logistic regression was used primarily to check which variables had association with the dependent variable individually and multivariable logistic regressions was conducted to identify factors that were associated with the practiced of standard precautions. All variables, with p-value < 0.25 in simple logistic analysis were candidate for multivariable logistic regression. Then independent predictors were determined using p-value <0.05 and adjusted odds ratio with 95% confidence interval.

Major findings from observation were narrated and summarized in terms of the components of standard precautions.

4.9. Data quality assurance and management

Before the actual data collection, the questionnaire was pre-tested on 5% of similar health professionals outside the study area which was in Dodola Hospital, West Arsi. After pretesting, the questionnaire was edited and corrected for wording, clarity and few important missed variables were added. The data collectors and supervisors were trained for two days on principles, ethical considerations and procedures. The principal investigator was closely

monitoring the data collection process. Completed questionnaires were checked for completeness every day immediately after data collection took place.

4.10. Ethical Consideration

Ethical clearance was obtained from Institutional review board of Jimma University Institute of Health. Letter of cooperation to all concerned bodies was obtained from Oromia Regional Health Bureau and Bale Zone Health Department. Informed consent was obtained from each Hospital and from each study participants by informing the purpose of the study, its procedure and confidentiality of the result.

4.11. Plan for dissemination

The finding of this study was presented to Jimma University, Department of Health economics, Management, and Policy. It was approved by the department; it will also be communicated to Bale Zone Health Department, each hospital and to other organizations working on standard precautions, Oromia Regional Health Bureau, and Federal Ministry of Health. The findings may also be presented in different seminars, meetings and workshops and published in a peer reviewed scientific journal.

Chapter 5: Result

5.1. Socio-demographic characteristics of the participants

From the total of 231 structured questionnaires distributed to study participants 230 were returned, of these, two incomplete questioners were excluded. Finally 228 completed questionnaires were used for analysis which gives a response rate of 98.7%. One hundred twenty one (53.1%) of the respondents were male, and one hundred forty (61.4%) were married. The age of the respondents ranges from 20 years to 55 years with mean age of 28.44 (SD \pm 4.2). There were 103 (45.2%) health professionals from Goba (referral) hospital and 80 (35.1%) from primary (Dello Mena and Bale Robe) hospital while the rest were from Ginnir (General) hospital. Among the study participants majority 125 (54.3%) were nurses by profession. Regarding educational status majority (63.6%) of the respondents were degree holders. The work experience of the participants ranges from 1 year to 35 years with median years of 3 (SD \pm 3.8) while majority had been working greater than 48 hours per week. Regarding the salary 1,916 and 10,470 ETB were the minimum and maximum monthly salary of the respondents respectively with median monthly salary of 4,085 ETB (SD \pm 2,308.54). Additionally, among the HPs participated in the study 84 (26.8%) had monthly risk allowance.

Table 1: Socio-demographic characteristic of health professionals in Bale zone Hospitals, South east Ethiopia, March 01-30/ 2017

Variable	Category	Frequency n=228	Percentage
Type of Hospital	Primary hospital	80	35.1
	General hospital	45	19.7
	Referral hospital	103	45.2
Sex	Male	121	53.1
	Female	107	46.9
Age in years	20-25	56	24.6
	26-31	134	58.8
	\geq 32	38	16.7

Table 1: Socio-demographic characteristic of health professionals in Bale zone Hospitals, South east Ethiopia, March 01-30/2017 (*continued*)

Current marital status	Single	87	38.2
	Married	140	61.4
	Divorced	1	0.4
Educational status	Diploma	83	36.4
	Degree	145	63.6
Professions	Medical Doctor	41	18.0
	Nurse	125	54.8
	Midwives	44	19.3
	Laboratory	18	7.9
Department	Emergency unit	22	9.6
	Pediatrics ward	27	11.8
	Maternity ward	41	18.0
	Operation unit	14	6.1
	Medical ward	24	10.5
	Surgical ward	20	8.8
	Laboratory unit	18	7.9
	Outpatient	62	27.2
Service in years	<5	160	70.2
	6-10	59	25.9
	>10	9	3.9
Total hours working per week	≤48	93	40.8
	>48	135	59.2
Monthly risk allowance	Yes	84	26.8
	No	144	63.2
Monthly salary in ETB	<2500	29	12.7
	2500-4000	78	34.2
	≥4000	121	53.1

5.1.1. Self-reported Knowledge of Health professionals on standard precautions

Regarding the knowledge of HPs on standard precautions, from the total score of 24 correct answer the mean knowledge score in this study was 13.84 (SD \pm 4.4), the minimum score was 6.0 and maximum was 24.0. Accordingly, among a total of 228 participants, more than half 126 (55.3%) had good knowledge on standard precautions. Besides, almost more than half of HPs working in all hospitals had good knowledge on standard precautions (Figure 3).

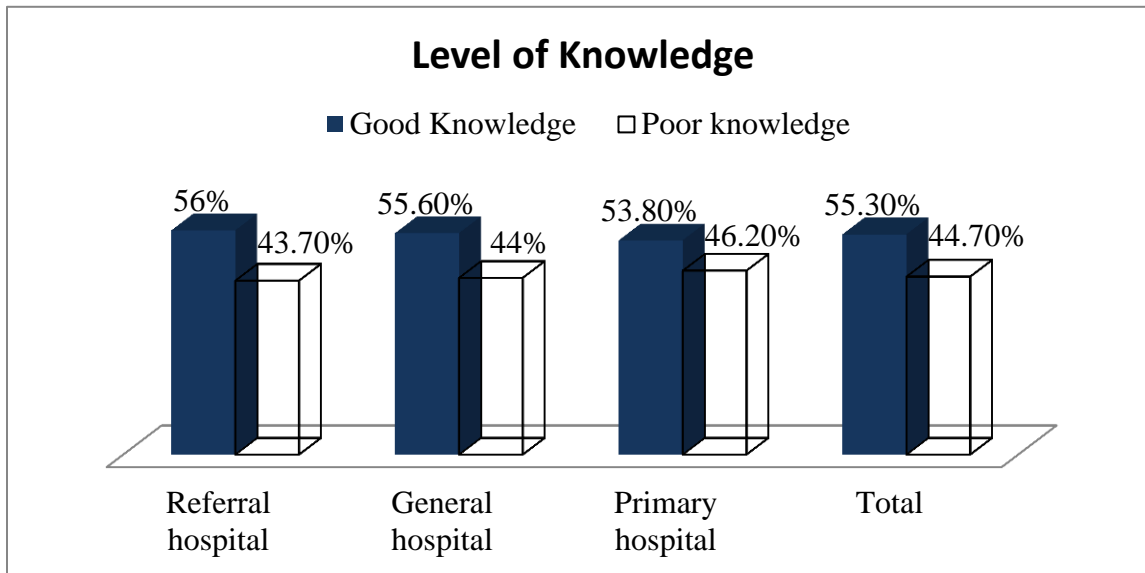


Figure 3: Level of knowledge of health professionals in Bale zone Hospitals, South east Ethiopia, March 01-30/2017

Majority (184 (80.7%) of the respondents reported that standard precaution is a basic infection control mechanism that must be followed by all health professionals. On the other hand 29.8% and 25.4% of the respondents replied that standard precaution is infection control that reduces the risk of transmission of blood borne pathogen from unrecognized source and recognized source respectively.

Regarding the application of personal protective equipment, only 34.2% and 26.8% of the health professionals replied that the selection of PPE were based on the nature of patient interaction and the likely mode of transmission respectively. Hand washing before direct contact with patients,

after any direct contact with patients and immediately after removal of glove were reported by 60.5%, 71.1% and 47.8% of the health professionals.

Majority of the study participants had an awareness that standard precaution should be practiced for any contact with blood 196 (86%), blood tinged body fluids 173 (75.9%) and vaginal fluids 116 (50.9%) of patients. Regarding the components of SP, hand washing, PPEs and safety box with international biohazard symbol were identified by 67.1%, 64.5% and 70.6% of the respondents respectively (Table 2).

Table 2: Frequencies and percentages of correct answers among health professionals for questions related to knowledge in Bale zone hospitals south east Ethiopia March 01-30/2017 (N=228)

Variables	Correct answer	%
Standard precaution is		
Infection control practices that must be followed by all health professionals	184	80.7
Infection control measures that reduce the risk of transmission of blood borne pathogens from unrecognized or unknown sources	68	29.8
Infection control measures that reduce the risk of transmission of blood borne pathogens from recognized or known source	58	25.4
Applications of standard precautions are		
Based on the principle that all blood, body fluids, non-intact skin, and mucous membranes may contain transmissible infectious agents.	132	57.9
Used when caring for all patients regardless of diagnosis or serological status of the patients.	118	51.8
Based on the nature of the procedure to be done	60	26.3
Selection of personal protective equipment to be used is based on		
The nature of health professional-patient interaction	61	26.8
Likely mode of transmission agents	78	34.2
Risk assessment and extent of contact anticipated with blood and body fluids.	172	75.4

Table 2: Frequencies and percentages of correct answers among health professionals for questions related to knowledge in Bale zone hospitals south east Ethiopia March 01-30/2017(*continued*)

Hand washing should be conducted		
Before any direct contact with patients	138	60.5
After any direct contact with patients	162	71.1
Immediately after gloves are removed	109	47.8
Standard precaution should be followed for contact with		
Blood	196	86.0
Vaginal fluid	116	50.9
Blood tinged body fluids	173	75.9
Components of standard precautions includes		
Hand washing	153	67.1
Personal protective equipment	147	64.5
Safety box with international biohazard symbol	161	70.6
Blood and body fluid of all patients are considered as potentially infectious for		
Human immune deficiency virus	141	61.8
Hepatitis B virus	184	80.7
Hepatitis C virus	104	45.6
Expose to blood and other body fluids		
Percutaneous injury	164	71.9
Mucocutaneous injury	125	54.8
Blood contact with non-intact skin	151	66.2

Among professional category, mid-wives (72.7%) and laboratory technologist/technician (72.2%) had better proportion of good knowledge than medical doctor (68.3%) and Nurse 42.4% (Figure 4).

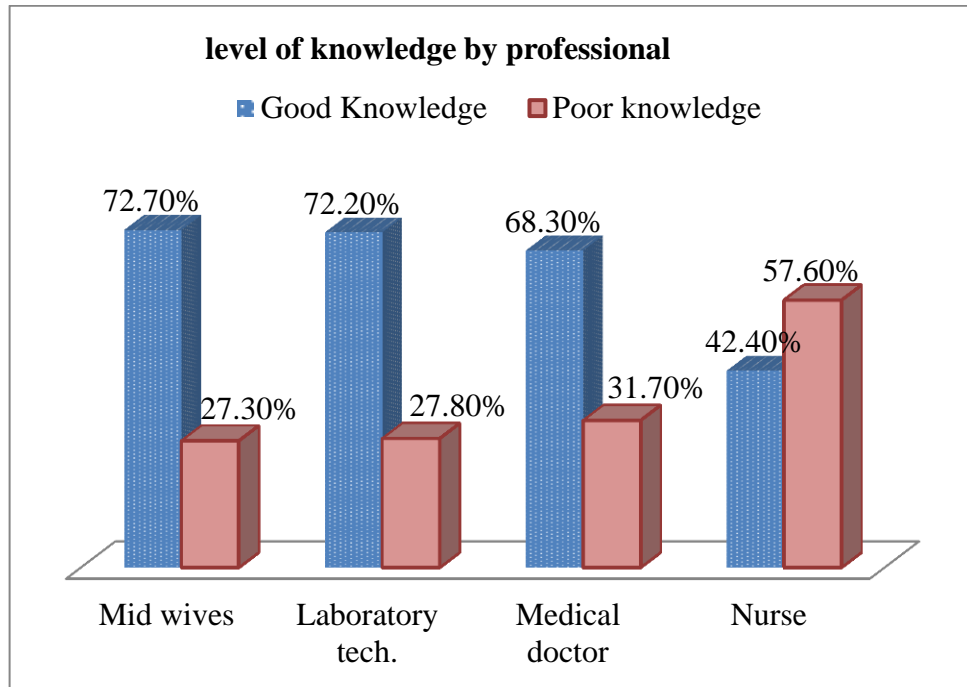


Figure 4: Level of knowledge of health professionals by type of professionals in Bale zone hospitals south east Ethiopia March 01-30/2017.

5.1.2. Self-reported attitude and health institution factors

Concerning the attitude of HPs towards standard precautions practice, the mean score was 39.25 with (SD \pm 7.6) and minimum score was 15.0 while maximum score was 50.0. Among a total of study participants, 132 (57.9%) had positive attitude while 42.1% had negative attitude towards standard precautions (Table 3).

Table 3: Attitude of health professionals towards standard precautions by type of hospitals in Bale zone south east Ethiopia, March 01-30/ 2017 (N=228)

Type of hospital	Attitude towards standard precautions practice	
	Positive attitude	Negative attitude
Primary hospital	48 (60%)	32 (40%)
General hospital	21 (46.7 %%)	24 (53.3%)
Referral hospital	63 (61.2%)	40 (38.8%)
Total	132 (57.9%)	96 (42.1%)

Among the respondents, 125 (54.8%) and 99 (43.4%) strongly agreed on the statement that standard precautions can prevent spread of infection from patients to health professionals and from health professionals to patients respectively. On the other hand, 40.4% of health professionals strongly agreed on the fact that hand washing is effective method to prevent transmission of pathogen associated within healthcare, and only 14.5% of respondents strongly agreed that using alcohol based preparation for hand disinfection is preferred over antimicrobial soap and water. Seventy three (32.02%) and seventy eight (34.21%) of the respondents strongly agreed that hospital management can improve standard precautions practice though conducting regular supervision and also responsible to achieve compliance of health professionals' with standard precautions respectively (Table 4).

Table 4: Frequency and mean score of health professionals attitude towards standard precautions in Bale zone hospitals south east Ethiopia March 01-30/2017 (N= 228)

Variable	Strongly disagree	Disagree	Not decide	Agree	Strongly agree	Mean
Standard precautions can prevent spread of infections from patients to health professionals	2	6	4	91	125	4.45
Standard precautions can prevent spread of infections from health professionals to patients.	4	41	15	69	99	3.96
Standard precautions are simple to follow.	5	42	28	91	62	3.71
Hand washing is effective methods to prevent transmission of pathogens associated within health care	2	24	19	91	92	4.08
Using approved waterless alcohol based products for hand disinfection is preferred over antimicrobial or plain soap and water.	3	77	32	83	33	3.29
Blood and body fluid of all patients are considered potentially infectious for human immune deficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV).	5	36	24	69	94	3.93
In the absence of standard precaution health care facilities can be the source of infection.	1	17	27	83	100	4.16
Disinfection of medical equipment should be ensured by all health professionals’.	4	24	10	91	99	4.13
Hospital management can improve standard precautions practice though conducting supervision.	7	48	17	83	73	3.73
Hospital management is responsible to achieve compliance of health professionals’ with standard precautions.	6	46	10	88	78	3.82

Health institutions/hospital factors were also assessed. Accordingly from a total 228 study participants, only 89 (39.0%) of the respondents reported the availability of written guidelines that explain how to apply standard precautions in their working room. Availability of water (tap or with Jerry can), adequate PPE and sharp material container with international biohazard symbol in their working rooms were reported by 47.8%, 43.9% and 74.1% of the respondents respectively. Among the study participants, only 80 (35.1%) of them received training on standard precautions practice. Encouragement of HPs to improve the practice of standard precaution by hospital management through regular supportive supervision were only reported by 72 (31.6%) of the respondents (Table 5).

Table 5: Frequency distribution of health institution factors among health professionals in Bale zone hospitals south east Ethiopia March 01-30/2017

Variable	Yes	Percentage
Written guidelines that explain how to apply standard precautions is available in your working room	89	39.0
The written guideline is clearly states how to apply standard precautions. (if available)	76	85.4
Tap water or with “Jerry can” is always available in your working room	109	47.8
Provision of personal protective equipment is <i>adequate</i> in working room Notes: <i>Adequate</i> implies availability of <u>Glove</u>, <u>goggle</u>, <u>mask</u>, <u>apron</u>	100	43.9
Sharp materials container with international biohazard symbol is always available in your working room/unit	169	74.1
Received training on standard precautions practice.	80	35.1
Hospital management encourages the improvement of standard precautions practice. [Encouragement includes <i>regular supportive supervision and providing feedback or rewarding recognition for practice of standard precautions or all</i>]	72	31.6

5.1.3. Self-reported standard precautions practice of Health professionals

Considering standard precautions practice of HPs nearly two-fifth (91 (39.9%)) of the HPs had good compliance with standard precautions practice while three-fifth (137 (60.1%)) had poor practice of standard precautions (Table 6).

Table 6: Frequency distribution of compliance with standard precautions practice among health professionals in their respective hospitals in Bale zone, south east Ethiopia March 01-30/2017

Type of hospital	Level of compliance with standard precautions practice	
	Good	Poor
Primary hospital	30 (37.5%)	50 (62.5%)
General hospital	18 (40%)	27 (60%)
Referral hospital	43 (41.7%)	60 (58.3%)
Total	91 (39.9%)	137 (60.1%)

From a total of 228 of study subjects, only 54 (23.7%), 35 (15.4%), 38 (16.7%) and 22 (9.6%) of the respondents always practice hand washing after contact with patients, hand washing with antiseptic soap, hand washing after removal of glove and hand rubbing with alcohol based preparation respectively. Regarding personal protective equipment, 145 (63.6%), 28 (12.3%), 20 (8.8%) and 31 (13.6%) of the study participants reported that they always practiced wearing glove, mask, goggle and plastic apron when there is splash of blood or body fluids. Majority of the HPs 179 (78.5%) always discard used needle and sharp materials in puncture proof container with international biohazard symbol (Table 7).

Table 7: Frequency distribution of compliance with standard precautions practice among health professionals in Bale zone hospitals south east Ethiopia, March 01-30/2017 (N=228)

Variable	Always	Often	Seldom	Never	Mean
Hand washing after any direct contact with patients.	54	65	101	8	2.72
Hand washing with antiseptic-containing soap and water.	35	57	126	10	2.51
Perform hand rubbing with an alcohol-based preparation	22	76	122	8	2.49
Hand washing immediately after removing gloves.	38	66	116	8	2.59
Wearing gloves for contact with body fluids or blood and mucous membranes.	145	57	25	1	3.52
Change gloves between contacts with different patients	129	70	26	3	3.43
Wearing Mask when there is a splash of blood or body fluids.	28	52	121	27	2.36
Wearing goggle when there is a splash of blood or body fluids.	20	31	132	45	2.11
Wearing a plastic apron when there is a splash of blood or other body fluids.	31	36	112	49	2.21
Wearing rubber boots/overshoes when a large area of floor is grossly contaminated with blood and other fluids.	19	28	115	66	2.00
Cleaning reusable medical equipment immediately after use	123	59	33	13	3.28
Discard used needle and sharp materials in puncture proof container with international biohazard symbol.	179	35	14	0	3.72

5.2. Association of dependent variable with independent variable

Using bivariate logistic regression associations between standard precautions practice and socio-demographic, knowledge, attitude and hospital related factors were made. Thus in bivariate logistic regression among socio-demographics sex, level of education, age and working hours per week were associated with standard precaution practice at p-value <0.25 but marital statuses, professional category, service years, current department, level of hospital, monthly salary and monthly risk allowance were not associated with the outcome of this study. Having training on standard precautions practice, availability of written guideline in working room, encouragement by hospital management, attitude towards standard precautions and knowledge were also significantly associated with standard precautions practice.

In multivariable logistic regression all variable that shows significance in bivariate logistic regression at p-value <0.25 were entered and age, availability of written guidelines, training, attitude and knowledge were left in the logistic regression model. According to this study health professionals whose age range from 26-31 were 2.7 times more likely to practice SP than those whose age were greater than 32 years at [AOR= 2.66, 95% CI =1.06, 6.7]. The study found out that compliance with standard precautions practice among health professionals working in rooms which has no written guidelines were less likely to decrease by 57.0% [AOR= 0.43, 95%CI= 0.23,0.81] as compared to those working in rooms having written guidelines, health professionals who did not trained on SPP were 62.0% less likely to practice SP than those who were trained on SP at [AOR=0.38, 95%CI= 0.2, 0.72], and the odd of good compliance with standard precaution practice was more likely to increase by 2.27 times in HPs who had good knowledge on SP when compared to those who had poor knowledge at [AOR=2.27, 95%CI= 1.19, 4.32]. Multivariable logistic analysis also showed that odds of good compliance with standard precautions practice was 2.4 times higher in health professionals who had positive attitude towards standard precautions when compared to those who had negative attitude [AOR=2.4, 95%CI= 1.24, 4.67] (Table 8).

Table 8: Factors associated with standard precautions practice among health professionals in Bale zone south east Ethiopia, March 01-30/2017

Variable	category	Compliance with standard precautions practice		COR (95%CI)	AOR (95%CI)
		Good	Poor		
Sex	Male	44	77	0.73(0.43-1.24)*	0.79(0.42-1.47)
	Female♦	47	60	1	1
Age in years	20-25	26	30	2.25(0.92-5.54)*	2.27(0.82-6.27)
	26-31	55	79	1.77(0.79-3.95)*	2.66(1.24-4.61)**
	≥32♦	11	27	1	1
Educational level	Diploma	28	55	0.66(0.38-1.2)*	0.57(0.29-1.1)
	Degree♦	63	82	1	1
Working hours per week	≤48	32	61	0.68(0.4-1.2)*	0.67(0.36-1.3)
	>48	59	76	1	1
Availability of written guidelines	Yes♦	49	40	1	1
	No	42	97	0.35(0.2-0.61)*	0.43(0.23-0.81)**
Received training	Yes♦	48	32	1	1
	No	43	105	0.27(0.15-0.48)*	0.38(0.2-0.72)**
Encouragement by hospital management	Yes♦	42	30	1	1
	No	49	107	0.33(0.2-0.6)*	0.69(0.3-1.6)
Knowledge	Good	67	59	3.69(2.08-6.57)*	2.27(1.19-4.32)**
	Poor♦	24	78	1	1
Attitude	Positive	69	63	3.68(2.05-6.62)*	2.40(1.24-4.67)**
	Negative♦	22	74	1	1

N.B * significant at P- Value <0.25 ♣♣ statistically significant at P-value <0.05 ♦ Reference category

5.3. Observation

The hospitals were observed prior to introducing the questionnaire to the participants. An average of 2-3 days were spent in each institution to observe a total of 117 major clinical unit and working rooms which includes emergency unit, inpatient service (medical, surgical, pediatrics, gynecology, and maternity/labor wards), operation unit, outpatient department, and MCH and laboratory unit. During observation all hospitals had tap water which was connected to the main supply of the local water system. However from the total 117 observed unit in all hospitals only 31 (26.5%) (Emergency unit (10), laboratory unit (4), operation rooms (5), surgical ward (4) and maternity/labor (8) had running tap water in their working rooms, while soap was available and used only in 20 (17.1%) of observed rooms specifically in operation room, maternity/labor and laboratory unit of each hospital.

Availability of personal protective equipment in each hospital was also observed. Accordingly during observation only glove (surgical and disposable) were available in 89(76.1%) of working rooms while goggle, mask, plastic apron and rubber shoes were available in maternity/labor and operation rooms which accounts only 13 (11.11%) among the total observed rooms.

Alcohol-based product/prepared used for hand rubbing was available at laboratory, maternity, MCH and operation unit were available at 30 (25.64%) of the observed rooms. On the other side there were no observed used needles, sharp materials on the ground and surrounding of the observed unit/room. Only blood was observed on the ground at 2 working rooms (emergency unit).

Reusable medical equipment's were routinely and frequently used in emergency unit, surgical OPD, operation rooms, maternity/labor, surgical ward and laboratory unit. Reusable medical equipment's left with blood and few tissue were only observe in 3 (emergency rooms) while those frequently used reusable medical equipment was immediately decontaminated it.

Further observation was made at each labor ward of each hospital and all delivery coach was decontaminated after delivery was conducted. Regarding needles and sharp material disposal, 112 (95.7%) of the observed clinical working rooms had puncture proof container with international biohazard symbol. However among the observed safety box in working rooms 45 (40.2%), 15(13.4%) and 32 (28.6%) were overfilled, empty and few needles seen through the

hole respectively. Twenty (17.85%) of the observed safety box were filled at its three fourth.

From all observed rooms only 42 (35.9%) (maternity/labor, laboratory, surgical wards and few OPD) of them had written guideline or standard operating procedures.

Table 9: Frequency of clinical working rooms having components of standard precaution among hospital in Bale zone, March 01-30/2017 (Total number of observed rooms=117).

Components of standard precautions	Bale Robe hospital	D/Mena hospital	Ginnir hospital	Goba hospital	Total	%
Availability of tap water /by Jerry can in working rooms	5	5	8	13	31	26.5
Availability of glove (surgical/disposable)	26	17	20	26	89	76.1
Mask*,(goggle, plastic apron, rubber boots/overshoes)◆	4	2	3	4	13	11.1 1
Alcohol based preparation for hand rubbing	7	6	9	8	30	25.6
Written guideline/ standard operating procedures	13	8	10	11	42	35.9
Soap for hand washing	4	3	6	7	20	17.1
Safety box with international biohazard symbol	34	24	29	25	112	95.7

N.B. ◆ only available in labor and operation rooms * available in tuberculosis treatment, labor and operation rooms.

Chapter 6: Discussion

Standard precautions are designed to prevent health care workers and patients from being exposed to potentially infected blood and body fluid by applying the fundamental principles of infection control, through hand washing, utilization of appropriate protective barriers such as gloves, mask, gown, and eye wear (4). In Ethiopia, there is a paucity of studies that describe compliance with Standard Precautions (SPs) among health professionals. This study found out that, from the total 228 study participants the overall good standard precautions practice by health professionals was found to be only (39.9%). The practice of SP in this study is agree with study done in Mekele, Ethiopia, in which 42.9% had good standard precautions (19). When each of the specific components of SPs was analyzed, relatively lower proportion of HPs were found to be always practiced hand washing after any direct contact with patient (23.7%) and immediately after removing gloves (16.67%) and this result was less than study done in Nigeria where 58% and 63.6% and in Northwest Ethiopia 27.8% and 80.6% of HPs had always practiced hand washing after contact with patient and immediately after removal of glove respectively (24,25). The difference of the finding might be attributed by the difference in academic background, individual interest or behavior of study participants to be complied with standard precautions practice.

This study uncovered that the significant proportions (60.1%) of health professionals were poorly complied with standard precautions practice and specifically not always practiced some of the components of standard precautions like utilizations of PPEs. According to this study HPs who always wearing goggle (8.8%), mask (12.3%), plastic apron (13.6%) and rubber shoes (8.3%) when there was splash of blood or other body fluids were very low. This finding was agree with study done in Mekele, Ethiopia which only 10.5% of HPs worn goggle and mask and in Nigeria (12.50%) and (15%) of the respondent always uses mask and goggles respectively (19,28). The possible implications of these findings could be that the HPs were not protecting themselves, patients, and families from transmissible infections as per the recommended guidelines and national standard operating procedures. The possible explanation for these findings in this study could be lack of up-to-date training on the standard precautions in which only (35.1%) of health professionals received training. Moreover, unavailability of certain personal protective equipment (e.g., goggles, apron and faces masks) may also be additional

potential reasons for the lower performance and this possible reason was supported by observation done in which only (11.11%) working rooms had those mentioned PPEs .

On the contrary, this study showed that (63.6%) and (56.6%) of HPs were always wearing glove for contact with body fluids, blood and mucus membrane and change gloves between contact with patients respectively. This finding could strengthen the assumption that the low practiced in other components might be due to unavailability of personal protective equipment. This study further showed that used needle and sharp materials were disposed in puncture proof container with international biohazard symbol by (78.5%) of the respondents and this finding was agree with study done in Nigeria and Mekele in which (80%) and (79.5%) of the respondents disposed used syringe and needles in the safety box respectively (19,28).

Study conducted in Mekele Ethiopia showed the significant association of professional category and sex of health professionals with standard precaution practice (19). However in this study sex and professional category were not statistically significant with standard precaution practice.

This study further assessed knowledge of HPs on standard precautions and better proportion (55.3%) of HPs had good knowledge on standard precautions. Multivariable logistic regression showed that having good knowledge on standard precaution were significantly associated with good compliance with standard precautions practice in which those who had good knowledge on standard precaution were 2.2 times more likely to have good compliance with standard precaution practice compared to those who had poor knowledge. This finding were agreed with study done in Nigeria that good knowledge of SP was significantly associated with good practice ($p = 0.02$) (27). Implications of this finding could be enhancing the capacity of health professional on basic concept, contents and activities on standard precaution in line with nationally and internationally recommended guidelines and updating knowledge with evidence based information can more improve the practice of standard precautions in health setting.

Furthermore levels of agreements of HPs towards standard precautions were assessed. Accordingly in this study less than half of health professionals strongly agreed on the fact that standard precautions can prevent spread of infections from health professionals to patients while (54.8%) strongly agreed that standard precautions can prevent spread of infections from patients to health professionals. On the other hand that less than half of HPs were agreed and strongly

agreed on statement that standard precautions were simple to follow according to (39.9%) and (27.2%) of the respondents respectively. However standard precautions is regarded as simple and effective means of protecting HCWs, patients, and the public, thus reducing hospital acquired infections (2,5). Additionally, treating all patients in the health care facility with the same basic level of standard precautions involves work practices that are essential to provide a high level of protection to patients, health care workers and visitor (22).

But in this study the composite item related to attitude of HPs towards SPP revealed that more than half (57.9%) of the participants had positive attitude towards standard precautions. The odd of good compliance with standard precautions practice was likely to be higher by 2.4 times among HPs who had positive attitude towards standard precautions [AOR=2.4, 95%CI=1.24, 4.67] compared to those who had negative attitude. This finding could be explained by the fact that whenever HPs improved attitude of risk of exposure to transmissible infection, their level of practice to preventive guidelines and procedures would increase.

On the other hand in this study lower availability of written guidelines were reported by 39% of study participants and only 35% of HPs had receive training on standard precautions. In this study lack of written guidelines in working rooms and training on standard precautions had been significantly associated with poor standard precautions practice. This finding was similar with study done in Mekele in which working in rooms without written guidelines were decreased standard precautions practice by 80% than working in rooms which had written guidelines and lack of training on standard precautions were also decreased practice by 60% when compared to trained health professionals (19). Absence of written guidelines were supported by observed rooms that only (36%) of observed rooms had written guideline or standard operating procedures. This finding implies that negligence/failure of the hospital management and concerned organizations that work on standard precautions program to provide training and disseminating the necessary written guidelines in order to improve the safe practice of the health professionals.

Chapter 7: Conclusion and recommendation

7.1. Conclusion

This study revealed that there was poor compliance with standard precautions practices among the study population in health care setting that may increase the risk of exposure to transmittable infectious. The findings of the study also indicate that the compliance of health professionals with specific components of standard precautions was poor that preventing transmittable infections from patients to health professionals and vice versa was limited and this is detrimental for health professionals and patients. The independent predictors include training and knowledge on standard precautions, written guidelines/materials and attitude towards standard precautions were found to be statistically significant with compliance with standard precaution practice among health professionals.

7.2. Recommendation

Effort to bring about changes in these major predictors of compliance with standard precautions practice among health professionals as per recommended on national and international guidelines is recommended. Therefore, this required concrete commitments from all concerned organizations working on standard precautions. Accordingly:-

Oromia Regional Health Bureau

- ❖ Providing up to date national and international standard precaution guidelines to health professionals at health care facilities.
- ❖ Supporting and providing periodic training on standard precautions for health professionals
- ❖ The regional health bureau should have to design strategy and implements that helps to up to date the knowledge of health professionals on the contents, components and activities of standard precautions.

Bale Zone Health Department

- ❖ Should support hospital by facilitating training on standard precautions.
- ❖ The zone should support and facilitate the provisions of written guidelines/standard operating procedures to health facility.

Hospital management

- ❖ Should facilitate periodic training on standard precautions through communicating with concerned organizations.
- ❖ Should ensure availability and dissemination of national guidelines in each clinical working rooms/unit of the hospital.
- ❖ Should have design effective strategy to improve the attitude of health professionals towards standard precautions practice.
- ❖ Strategy that improve and up to date the knowledge of health professionals towards standard precautions with evidence based information should be designed and implemented.

7.3. Limitation of the study

- ❖ The finding of this study was not generalized to other healthcare workers.
- ❖ Actual practice of standard precautions among health professionals was not observed.
- ❖ Since the study was based on self-reported data, possibility of respondent's bias that they were likely to over report their practice can be a threat.

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Part 1 Socio-Demographic character of health professionals

Q.#	Question	Response options
101	Sex?	1. Male 2. Female
102	Age in year?	_____
103	Salary in ETB?	_____
104	What is your current marital status?	1.Single 2.Married 3.Divorced 4. Separated 5. Widowed
105	What is your highest level of education?	1. College (certificate) 2. College (diploma) 3. University (first degree and above)
106	What is your professional category?	1. Medical Doctor 2. Nurses all type 3. Midwives all type 4. Laboratory tech. all type
107	In which department are you currently working for?	1. Emergency unit 2. Pediatric ward 3. Maternity ward 4. Operation theatre unit 5. Medical ward 6. Surgical ward 7. Laboratory unit 8. Outpatient department 9. If other specify_____
108	For how long are you working in health facility?	_____years and _____month
109	Average numbers of hours working per week?	1. 39 hours 3. >48 hours 2. 40-48 hours

Q.#	Question	Response options
110	Do you have monthly risk allowance?	1. yes 2. no
111	If yes for Q 110, how much?	1. <500ETB 2. \geq 500 ETB

Part 2 Knowledge of health professionals regarding standard precautions

Please circle on your answer

Q#	<i>MORE THAN ONE ANSWER IS POSSIBLE</i>
201	Standard precaution is <ol style="list-style-type: none"> 1. Basic infection control practices that must be followed by all health professionals. 2. Simple infection control measures that reduce the risk of transmission of blood borne pathogens from unrecognized or unknown sources 3. Simple infection control measures that reduce the risk of transmission of blood borne pathogens from recognized or known source
202	Which of the following is correct about Standard precautions? <ol style="list-style-type: none"> 1. Application standard precautions are based on the principle that all blood, body fluids, non-intact skin, and mucous membranes may contain transmissible infectious agents. 2. Standard precautions are used when caring for all patients regardless of diagnosis or serological status of the patients. 3. Decision regarding the level of precautions to be used is based on the nature of the procedure to be done
203	Selection of personal protective equipment by Health professionals is? <ol style="list-style-type: none"> 1. Based on the nature of the health professionals-patient interaction. 2. Based on the likely mode(s) of transmission of pathogen. 3. Based risk assessment and extent of contact anticipated with blood and body fluids.
204	Hand washing should be conducted <ol style="list-style-type: none"> 1. Before any direct contact with patients 2. After any direct contact patients 3. Immediately after gloves are removed.

205	For which of the following body fluids should standard precautions be followed? <ol style="list-style-type: none"> 1. Blood 2. Vaginal fluid 3. Blood tinged body fluids
206	Which of the following is/are components of standard precautions? <ol style="list-style-type: none"> 1. Hand washing 2. Use of personal protective equipment. 3. Discarding needle in puncture proof container with international biohazard symbol.
207	For which of the following viruses' blood and body fluid of all patients are considered as potentially infectious? <ol style="list-style-type: none"> 1. Human immune deficiency virus (HIV) 2. Hepatitis B virus (HBV) 3. Hepatitis C virus (HCV)
208	Which of the following can expose to blood and other body fluids? <ol style="list-style-type: none"> 1. Percutaneous injury (Needle stick /sharp injury) 2. Mucocutaneous injury (Splash of blood on the eye, mouth) 3. Blood contact with non-intact skin.

Part 3 Attitude of health professionals towards standard precautions

Q#	Question	1. Strongly disagree	2. Disagree	3. Not decide	4. Agree	5. Strongly agree
301	Standard precautions can prevent spread of infections from patients to health professionals					
302	Standard precautions can prevent spread of infections from health professionals to patients.					

303	Standard precautions are simple to follow.					
304	Hand washing is effective methods to prevent transmission of pathogens associated within health care					
305	Using approved waterless alcohol based products for hand disinfection is preferred over antimicrobial or plain soap and water.					
306	Blood and body fluid of all patients are considered potentially infectious for human immune deficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV).					
307	In the absence of standard precaution health care facilities can be the source of infection.					
308	Disinfection of medical equipment should be ensured by all health professionals’.					
309	Hospital management can improve standard precaution practices though conducting supervision.					
310	Hospital management is responsible to achieve compliance of health professionals’ with standard precautions.					

Part 4 Hospital related questions

Please circle on your answer

Q #	Question	Response option
401	Is there written guidelines that explain how to apply standard precautions in your working room?	1. Yes 2. No
402	If Yes for Q401, Does the guideline clearly state how to apply standard precautions?	1. Yes 2. No
403	Is tap water always available in your working room? [consider as <u>Yes</u> if water is available with “Jerry can”]	1. Yes 2. No
404	Is provision of personal protective equipment <u>adequate</u> in your working room? Notes: <u>Adequate</u> implies availability of <u>Glove, goggle, mask, apron</u>	1. Yes 2. No
405	Is sharp materials container with international biohazard symbol always available in your working room/unit?	1. Yes 2. No
406	Have you ever received any training on standard precautions practice?	3. Yes 4. No
407	Is hospital management encouraging you for the improvement of standard precautions practice though regular supportive supervision and feedback? <u>[Encouragement includes regular supportive supervision and providing feedback or rewarding recognition for practice of standard precautions or all]</u>	1. Yes 2. No

Part 5 Health professionals' standard precautions practice.

Please circle on your answer

Q501	How often do you practice the following standard precautions components?	
1	Hand washing after any direct contact with patients.	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
2	Hand washing with antiseptic-containing soap and water.	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
3	Perform hand rubbing with an alcohol-based preparation	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
4	Hand washing immediately after removing gloves.	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
5	Wearing gloves for contact with body fluids or blood and mucous membranes.	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
6	Change gloves between contacts with different patients	1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)

7	Wearing Mask when there is a splash of blood or body fluids.	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
8	Wearing goggle when there is a splash of blood or body fluids.	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
9	Wearing a plastic apron when there is a splash of blood or other body fluids.	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
10	Wearing rubber boots/overshoes when a large area of floor is grossly contaminated with blood and other fluids.	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
11	Cleaning reusable medical equipment immediately after use	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)
12	Discard used needle and sharp materials in puncture proof container with international biohazard symbol.	<ol style="list-style-type: none"> 1. Always (<i>If every time without any interruption</i>) 2. Often (<i>If practice many times</i>) 3. Seldom (<i>If rare times</i>) 4. Never (<i>if did not practice at any time</i>)

Thank you for your cooperation!!!!

Annex 2. Observation check list for each unit at each hospital

Name of Hospital _____ Name of observed unit/department _____

#	Activity should be observed	Observed option
1	During your observation is there running water in the working unit?	1. Yes 2. No
2	Is there antiseptic containing soap around hand washing sink in observed rooms? [consider any soap as Yes]	1. Yes 2. No
3	Is there alcohol-based product/prepared used for hand rubber in the observed unit?	1. Yes 2. No
4	Is there personal protective equipment available at the observed unit?	3. Yes 4. No
5	If yes for Q2 which are available at the observed room	1. Glove 2. Goggle 3. Mask 4. Plastic apron 5. Rubber boot/overshoes 6. if other specify _____
6	If no for Q2 which are not available at observed room?	1. Glove 2. Goggle 3. Mask 4. Plastic apron 5. Rubber boot/overshoes 6. if other specify _____
7	Is there written guidelines that explain how to apply standard precautions in working unit?	1. Yes 2. No
8	Have you observed used needle and sharp materials on the ground of the observed unit/room?	1. Yes 2. No
9	Have you observed blood and other body fluid on the ground of the observed unit?	1. Yes 2. No
10	Are there contaminated needles, syringe or other sharps in the surrounding of the observed unit/room?	1. Yes 2. No

11	Does the health care provider leave needle on the septum/ stopper of multidose vial?	1. Yes 2. No
12	Does the health care provider decontaminate medical instrument/equipment immediately after used?	1. Yes 2. No
13	Observed sterilization	1. Boiling 2. Autoclave 3. Oven 4. Chemical disinfection
14	Is there labelling of the date of sterilization or decontamination stock solution preparation?	1. Yes 2. No
15	At the time of observation is the examination / delivery coach decontaminated after delivery?	1. Yes 2. No
16	Type of needle and sharp collection material:-	1. Safety box with international biohazard symbol. 2. Plastic pail with lid 3. Plastic pail without lid 4. If other specify_____
17	How was the condition of the safety box or sharp container in the observed unit/room?	1. Over filled 2. Torn and needles seen through the hole 3. Empty or few dirty syringed and needles 4. Sharps materials mixed with other waste 5. Three fourth of safety box is filled