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HAND HYGIENE PRACTICE AND ITS ASSOCIATED FACTORS AMONG
HEALTH CARE WORKERS IN NEONATAL INTENSIVE CARE UNIT OF
HIWOT FANA SPECIALIZED UNIVERSITY HOSPITAL, EASTERN
ETHIOPIA

Residency Research Proposal

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**Hand Hygiene Practice and its Associated Factors Among Health Care
Workers in Neonatal Intensive Care Unit of Hiwot Fana Specialized
University Hospital, Eastern Ethiopia**

**A proposal to be submitted to department of Pediatrics and Child Health, School of
Graduate Studies, Haramaya University in Partial fulfillment of the Requirement for the
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LIST OF ABBREVIATION AND ACRONYMS

HCAI	Healthcare Associated Infection
HCW	Health Care Worker
HFSUH	Hiwot Fana Specialized University Hospital
HH	Hand Hygiene
IPC	Infection Prevention Committee
LMIC	Low- and Middle-Income Countries
NICU	Neonatal Intensive Care Unit
SDG	Sustainable Development Goals
WHO	World Health Organization

ABSTRACT

Background: Infections, including healthcare-associated infections, are one of the leading causes of neonatal morbidity and mortality. Correct and consistent hand hygiene practice is crucial in preventing the spread of antimicrobial resistance and reducing healthcare-associated infections. However, healthcare workers' compliance with optimal hand hygiene in the neonatal units is unexplored in several settings, including Ethiopia.

Objective: To determine hand hygiene practices and its associated factors among health care workers in the neonatal intensive care unit of Hiwot Fana Specialized University Hospital from December 16th, 2019 to January 14th, 2020.

Method: Institution based cross-sectional study will be conducted. The practice of hand hygiene will be assessed by directly observing 174 hand hygiene opportunities using standardized WHO hand hygiene observation form. Further, to assess associated factors of hand hygiene practice we will use self-administered questionnaire that adapted from WHO health care workers hand hygiene knowledge and practice assessment questioner. Data will be checked and entered using EpiData v 3.1 and will be analyzed using SPSS 20. Descriptive statistics will be used to describe sample characteristics and their correlation, and $p < 0.05$ will be used to determine statistical significance.

Expected outcome: The hand hygiene compliance of health care workers and factors affecting the practice will be known in the unit.

Budget: The total budget to conduct this study is 24,888 ETB.

Keywords: Hand hygiene, neonatal intensive care unit, , health workers, Associated factors, Ethiopia

1. INTRODUCTION

1.1. Background

Hand hygiene(HH), refers to any activity of cleansing once hand physically or mechanically to remove dirty material or organisms, through application of an antiseptic hand rub to decrease or inhibit growth of microorganisms or washing of hand with plain or antimicrobial soap and water (WHO, 2009). The hands of the health care workers have been shown to play a central role in the transmission of healthcare-associated pathogens. This universal vehicle of pestilent pathogens can rapidly become contaminated with normal flora and pathogen during routine patient care and risk of contamination increase with increasing duration of activities (Pessoa-Silva, Dharan et al. 2004, WHO, 2014). Neonates are prone to healthcare-associated infection with simple skin to skin contact, respiratory care and diaper change as their immunities are underdeveloped to protect them from infection (Pessoa-Silva, Dharan et al. 2004). Evidence has indicated that even the use of the glove alone cannot fully protect HCWs' hands from bacterial contamination such as *S. aureus*, enterococcus, *Clostridium difficile* and the like (Labarraque 1831).

Given the increasing burden of health care-associated infection (HCAI) along with the emergence of multidrug resistance, proper hand hygiene (HH) practice is becoming a major target of all infection prevention programs (Boyce, Chartier et al. 2009, Mathur 2011), thereby reducing the overall HCAI rate and expenses associated with its treatment costs(Chen, Wu et al. 2016).

Thus, WHO has designed "My 5 Moments for Hand Hygiene" approach to help in the protection of the patients, health care workers (HCWs) and the health-care environment against the spread of pathogens and ultimately reduce HCAs. Accordingly, HCWs are expected to clean their hands: before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient and after touching patient surroundings(Chartier et al. 2009, WHO, 2009).

1.2. Statement of the Problem

Newborns represent a unique and highly vulnerable patient population for infections. In addition to having an immature immunity, prematurity and lower birth weights in newborns are the most important factors that contribute to vulnerability to infection generally and HCAs in facility settings specifically. Apart from intrinsic factors like immunity, neonates who are admitted in NICU are very prone to HCAs due the underlying critical health problems requiring invasive devices and broad spectrum antibiotics (Denson et al. 2012). Pathogens that affect the neonate residing in the NICU is determined at least in part, by the NICU environment and the hands of HCWs for example when performing evasive procedures such as intravenous access, parenteral nutrition, urinal catheterization, oro/naso-gastric tubes (Denson et al. 2012, Philomène, 2014).

Researchers have indicated that neonatal mortality contributes to 45.1% of under-five mortality worldwide and even higher in in low- and middle-income countries (Bossemeyer et al. 2003,Dramowski et al. 2015, Oza et al. 2016, Mbotto et al. 2016). WHO also estimates that there are about 5 million neonatal deaths a year, 98% occurring in developing countries, and neonatal sepsis is one of the three important causes of neonatal mortality.(Sharland et al. 2005) which makes addressing these mortalities as one of the important targets of the Sustainable Development Goals (SDG) (IAEG, 2016).

HCAs have a multitude of effects that includes both economic and health problems, including: unnecessary costs for patients, lengthening hospital stay, disability, and death (WHO,2011). The rate of HCAs varies from country to country. For example, evidence has indicated that of every 100 hospitalized patients at any given time, 6 to 7 will acquire at least one HCAI in developed countries and 10 in developing countries. In low- and middle-income countries, HCAI frequency, especially in high-risk patients, is at least two to three times higher than in high-income countries, and device-associated infection densities in intensive care units are up to 13 times higher(Nejad et al. 2017). Approximately 30% of all HCAs develop in critically ill and vulnerable patients in ICU.(WHO, 2011)

Hospital-acquired neonatal infection rates in developing countries are three to 20 times higher than in industrialized countries. Moreover, Among hospital-born babies, these infections are responsible for 4% to 56% of all causes of death in the neonatal period, with three quarters

occurring in the South-East Asia Region and sub-Saharan Africa (Huskins et al. 2005). HCAI rates are particularly high in neonatal and pediatric ICUs (WHO,2011). The finding of systematic review and meta-analysis on burden of HCAI in developing countries showed an overall cumulative incidence as high as 40.8 infections per 100 patients (95% CI 16.1-71.1), and a HCAI incidence density of 30 episodes per 1000 patient-days (95% CI 25.0-35.0) in NICU patients(Nejad et al. 2011).

Fortunately, it has been reported that about 20% and 40% of this devastating health care challenge can be prevented by infection control measures applied under routine working conditions. (Sax et al. 2003, Borg 2010). HH practice has been regarded as the cornerstone and starting point of all infection prevention measures (Chartier et al. 2009).

Despite a global effort to improve hand hygiene practice in accordance with the WHO "Clean Care is Safer Care" campaign, many studies have shown that routine hand hygiene practices of health care workers to be <50% (Saiman et al. 2003); and even much lower in resource-limited settings(Holmen, Seneza et al. 2016). Ethiopia is one of those countries with high rates of HCAI,(Kotisso and Aseffa 1998, Kumie et al. 2016) with a corresponding low level of HCWs HH practice(Chartier et al. 2009). Facility-based observational studies from Ethiopia have shown a low level of HH practice among HCWs (ranging 2.1% to 20.6%),(Tefera et al. 2014, Kempker et al. 2014, Kolola and Gezahegn 2017,Tufa et al. 2017) below-average compliance rate (22.4%) for low income and middle-income countries (Gayet-Ageron et al. 2013).

A combination of undesirable factors including; high patient volumes, insufficient hand-washing facilities at the point of care, shortage of hand hygiene products and low hand hygiene skill level in most resource-limited settings, posed significant challenges to practice hand hygiene. (WHO, 2009). Despite the challenges faced in low income and middle income countries (LMIC), studies have shown that it is possible to improve hand hygiene practice without adding additional resources,(Chartier et al. 2009, Uwimana and Yoder 2015) through a combination of strategies, including infrastructure enhancement, education, reminders, and ongoing monitoring and feedback.(Chartier et al. 2009,Seneza et al. 2016).

Indeed the vulnerability of the neonates to HCAIs justify the importance of assessing HCWs HH practice and its associated factors which helps to design effective infection prevention

program in the study area. Moreover, as far as our knowledge is concerned, there is no study evaluating HH practice and its associated factors among health care workers serving in the NICU in the eastern Ethiopia in general. Therefore, this study aims to assess HH practice, compliance and factors associated with the practice among HCWs in NICU of HFSUH.

1.3. Significance of the study

The primary beneficiary of this study is the HCWs and the neonates. And also finding of this study will be an input for HFSUH and the regional health bureau in planning, and designing their strategies. Furthermore, program managers and experts will use the finding as standing point in their effort to improve the quality of neonatal care delivery and to foster sustainable infection prevention activities. In addition, our finding can serve as baseline for researcher interested in related topics.

1.4 OBJECTIVES

1.4.1. General Objective

To assess HHpractice and its associated factors among health care workers in NICU of Hiwot Fana Specialized University Hospital from December 16th, 2019 to January 14th, 2020.

1.4.2. Specific Objectives

- ✓ To assess level of HH practice of HCWs in NICU.
- ✓ To assess factors associated with HH practice in NICU .

2. LITERATURE REVIEW

2.1 Hand hygiene practice

Despite high magnitude of HCAI and the importance of adherence to infection control policies, proper HH practice has remained unacceptably low from both developed and developing countries (WHO, 2017). Globally, adherence of HCWs to recommended HH procedures has been reported as variable, with mean baseline rates ranging from 5% to 89% and an overall average of 38.7% (Chartier et al. 2009) .

A review of studies from high income countries has showed an overall HH compliance ranging from 4% to 100% (Daha et al. 2010). Another multicentric observational study in surgical ward across Europe showed overall HH compliance to be 40% with wide variation among hospitals ranging from 14% to 76% (Chalfine et al. 2011).An overt observation study in neonatal and pediatric intensive care units in Turkey found an overall HH practice of 37.0% (Karaaslan, Kepenekli Kadayifci et al. 2014). Another study from NICU in Germany showed an overall HH practice to be 61% (Oude-Aost et al. 2011).

A Systemic review of sub-Saharan African studies indicated overall HH practice of 21.1% (Dyson et al. 2019). Other studies from NICU in Africa showed overall HH practice of 15% in Kenya, 25 % in Egypt, 38% in Uganda, 25% in Rwanda (Musabyimana et al. 2016, V Murila et al. 2018, Anwar and Elareed 2019).

Study done at Black Lion University Hospital showed an overall HH compliance of 2.1% which significantly increased to 12.7% after the implementation of the HH campaign (Schmitz, Kempker et al. 2014). Another interventional study from Asella University Hospital in Ethiopia, showed an overall HH compliance 1.4% at baseline which increased to 11.7% and 13.1% in the first and second follow up respectively ($p < 0.001$). (Pfäfflin, Tufa et al. 2017). Similarly, a study from Gondar showed lower HH compliance rate of 16.5% while other study from Debre Berhan indicated relatively higher compliance 20.6% (Abdella, Alemayehu et al. 2014, Kolola and Gezahegn 2017). An observational study among nurses working in different units of HFSUH in Ethiopia, showed an overall HH practice of (18%) (Awoke, Geda et al. 2018).

2.2 Associated factors

2.2.1. Socio demographic factors

Based on the prospective cross sectional study conducted in Nigeria in 2010 reported sex was significantly associated with hand hygiene practice, more female washed their hands frequently than their male counterparts ($p=0.013$) (Tobi and Enyi-Nwafor 2013). According to the cross-sectional study conducted in Uganda in 2008 indicated female nurses practice hand hygiene was associated factor (AOR 1.33 95%CI 0.65–2.73) (Nalwadda et al. 2015).

In cross-sectional study conducted in Uganda in 2008, Nurses with age category <35 Years was significantly associated with hand hygiene practice (AOR 1.15 95%CI 0.56–2.37) (Nalwadda et al. 2015) .

2.2.2. Individual factors

2.2.2.1. Type of patient contact

Findings of review of studies from high income countries has showed lower HH before patient contact (21%) than after patient contact (47%) (Daha et al. 2010). Another multicentric observational study in surgical ward across Europe showed higher compliance with “after” indications (46%) for HH (after body fluid exposure risk, after touching a patient or their immediate surroundings) than “before” indications (31%) (before touching a patient or performing a clean or aseptic procedure) were reported (Chalfine et al. 2011). Similarly, an overt observation study in neonatal and pediatric intensive care units in Turkey showed significant variation of HCWs HH practice by indications, which is 43.2% for before patient touching, 8.5% for before clean/aseptic procedure, 18.1% after body fluid exposure, 68.1% after contact with patients, 43.2% after contact with patient surroundings [$P < 0.05$] (Kepenekli Kadayifci et al. 2014). But study from NICU in Germany showed significantly higher compliance rates for before patient contact and aseptic tasks (78%) than after patient, patient body fluid, or patients’ surrounding contact (57%; $P , .001$). (Oude-Aost et al. 2011)

A Systemic review of sub-Saharan African studies indicated higher HH practice for after patient contact (39.1%) than before patient contact (16.3%) (Dyson et al. 2019). Similarly other studies from NICU in Africa has shown higher HH practice for after indication than before indications

and indication just after contacting patient's surrounding was the most ignored (Musabyimana et al. 2016, V Murila et al. 2018).

observational study from Debre Berhan referral hospital in Ethiopia, showed relatively lower HH compliance before patient contact (2.4%; 95% CI: 0.9–5.3), before an aseptic procedure (3.6%; 95% CI: 1.6–7.6) and after contact with patient surroundings (3.3%; 95% CI: 1.2–7.9), whereas better levels of compliance were found after body fluid exposure (75.8%; 95% CI: 68.0–82.3) and after patient contact (42.8%; 95% CI: 35.2–50.7) (Kolola and Gezahegn 2017).

2.2.2.2. Professional categories

Findings of review of studies from industrialized world have indicated that Physicians are generally associated with lower recommended HH compliance rates than nurses (Daha et al. 2010). Other study from Europe has also shown higher HH practice for nurses (41.1% in Turkey, 66% in Germany) than physician (31.9% in Turkey, 52% in Germany) (Oude-Aost et al. 2011, Kepenekli Kadayifci et al. 2014).

A Systemic review of sub-Saharan African studies indicated higher HH practice compliance for physician irrespective of the type of patient contact (Dyson et al. 2019). Similar findings that indicated physicians higher HH compliance rate from studies conducted at NICU in Africa (Musabyimana et al. 2016, V Murila et al. 2018). However, Study done at Black Lion University Hospital, Ethiopia has shown that nurses had better HH adherence when compared with the reference group (physicians, medical interns, other HCWs) (aOR = 3.7, 95% CI 1.6-8.7, p = 0.003) (Kempker et al. 2014)

2.2.2.3. Knowledge and training

A systemic review of sub-Saharan African studies on barriers to HH practices has identified poor HH knowledge/training as a barrier to HH practices (Dyson et al. 2019). In a study from Ethiopia, it was found that having good knowledge of HH practice is associated with (AOR = 3.80, 95% CI 1.60, 8.97) compliance in HH practices compared to those who had poor knowledge. Furthermore, the same study has indicated that training on HH also have significant association with HH practice (AOR = 2.60, 95% CI 1.21, 5.62) (Alemayehu et al. 2014). Similar

findings that indicated an association between training and HH practices were reported from study that was conducted in Iran ($P < 0.05$) (Fanaei et al. 2015).

2.2.2.4. Glove use

HCWs preference for glove use has been considered as HH practice barrier by many researchers (Chartier et al. 2009, Ali et al. 2018, V Murila et al. 2018, Dyson et al. 2019). A study from Iran have shown that all HCWs uses gloves for all HH opportunities without appropriate HH practice (Niyokwizerwa et al. 2017).

2.2.2.5. Heavy workload and under staffing

Heavy workload, evidenced by the low densities of doctors and nurses against the WHO recommended minimum (Dal Poz et al. 2009) is noted as HH practice barrier (Chartier et al. 2009, Chalfine et al. 2011, Salia et al. 2016, Kumar Gupta et al. 2017, Dyson et al. 2019). It is often linked to stressful work situations and the shortage of HCWs in SSA, a barrier typical of virtually all health care systems (Dyson et al. 2019).

2.2.2.6. Forgetfulness

Researchers have demonstrated the forgetfulness of HH activities as global barrier of HH practice. (Chartier et al. 2009, Salia et al. 2016, Dashti et al. 2016, V Murila et al. 2018, Dyson et al. 2019). And use of HH posters in key locations may act as visual reminders to HCWs to perform HH (Dyson et al. 2019).

2.2.3. Organizational Factors

In review study from sub-Sahara Africa, researchers have identified lack, insufficient or poor quality of soap and water as a barrier of HH practice. And also lack of, insufficient, leaking, and/or blocked sinks and unavailability of alcohol based hand sanitizer have been identified as barriers. This review has also indicated inaccessible or inconveniently located HH facilities and lack of support, commitment, and motivation by hospital managers as a barrier to HH practices (Dyson et al. 2019).

A cross sectional study conducted in Gondar University Hospital, Ethiopia showed significant association of HH practice with availability of soap and water (AOR 3.20 95% CI 1.86, 5.55), 59.5% of respondents indicated lack soap and water as barrier of HH. It also showed that

availability of alcohol based hand rub and sink in the working ward increases HH practice by 6.58 times (AOR = 6.58, 95% CI 2.67, 16.22) and 2.46 times (AOR = 2.46, 95% CI 1.44, 4.21) respectively. Moreover, in this study knowledge of HCWs on the presence of infection prevention committees (IPC) was significantly associated with HH practice, respondent who knows that there is IPC practiced HH 2.6 times more than those who do not know (AOR = 2.6, 95% CI 1.23, 5.37)(Alemayehu et al. 2014).

2.3 Conceptual framework

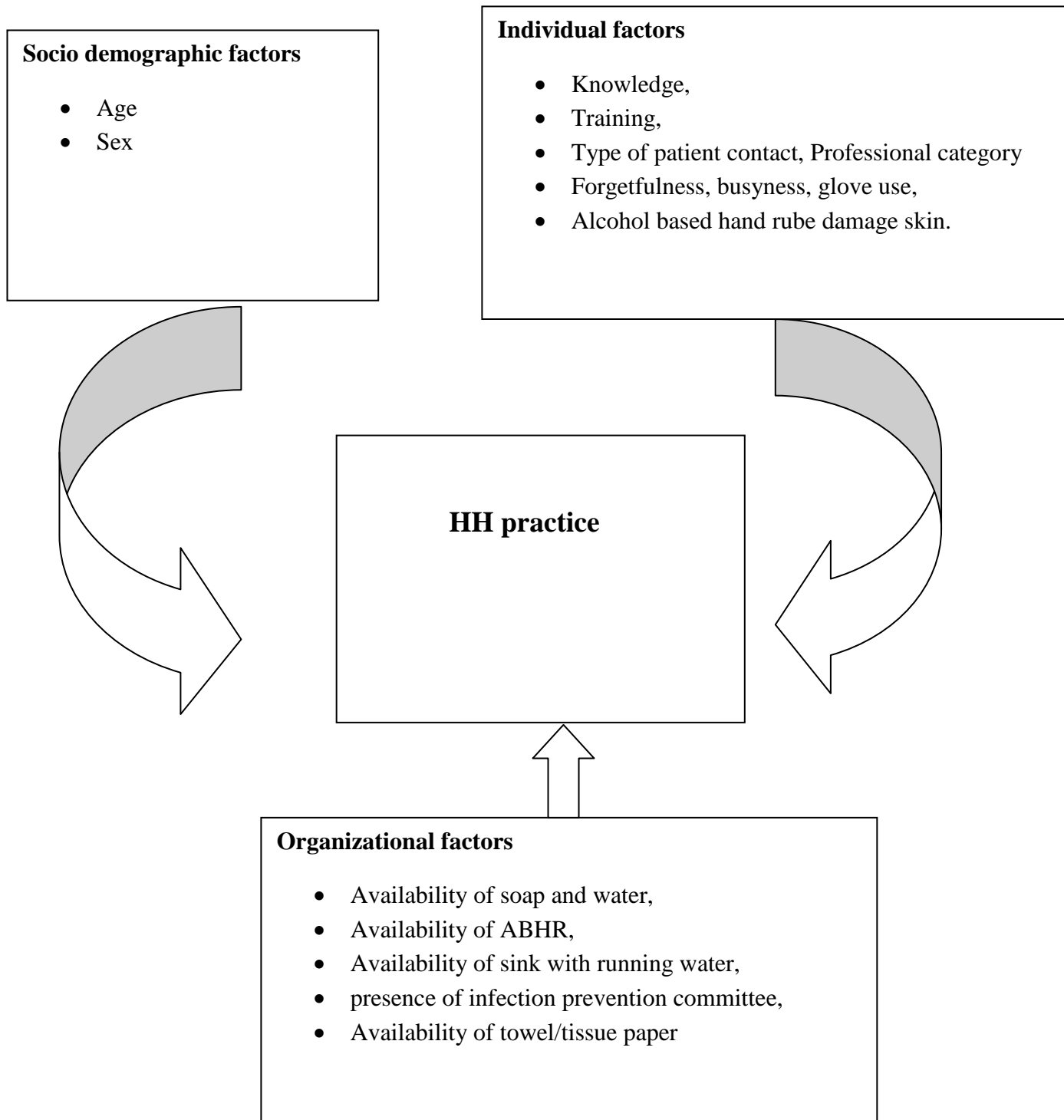


Figure 1 : Conceptual framework of HH practice among health care workers (developed based on the literature) (Alemayehu et al. 2014).

3. METHOD AND MATERIALS

3.1. Study area and period

The study will be conducted in Harar Neonatal Intensive Care Unit of Hiwot Fana Specialized University Hospital from December 16th, 2019 to January 14th, 2020. Harar is a walled city in the eastern Ethiopia. It is a capital of Harari region. The city is located on a hilltop in the eastern extension of the Ethiopian Highlands, about five hundred kilometers from the national capital Addis Ababa at an elevation of 1,885 meters.(Ketema, Kebede et al. 2016) There are nine woredas in Harari region, under the woreda there are 19 city kebeles and 17 rural kebeles. The State's size is estimated at 340 km².The Harari National Regional State (HNRS) is populated by 183,344 people (CSA 2007). The percentage share of males and females is about 50% each. The urban residents of the State are 99,321 while its rural inhabitants are 84,023.(Regassa 2011) According to the current regional health bureau, there are University hospital, Government Hospital, Army Hospital, Federal Police Hospital, two private Hospitals, one non-government (Fistula) hospital, eight Health Centers, twenty nine private clinics, twenty six health posts and one regional laboratory serving the people of the state (Regassa 2011).

Hiwot Fana Specialized University Hospital is one of the hospitals in the city administered under Haramaya University. It serves as the Referral Hospital for the State and East Hararghe zone.

The hospital has neonatal unit next to obstetric and maternity wards. The unit is divided into three; the outer part located just at the entrance which is patient reception and resuscitation area, the main room, used for admission of critically ill patients (9 beds), the innermost room is for subcritical patients. There is also a separate room, next to the main neonatal unit, for preterm newborns for Kangaroo Mother Care (KMC). There is one hand washing basin just at the entrance of the NICU, and alcohol containing bottle in every patient zones, tied to their cribs/beds.

There are one senior pediatrician three pediatric residents, sixteen medical interns and eleven nursing staff and sixteen medical and ten nursing students per month in the unit.

3.2. Study design

Hospital based cross-sectional design will be used

3.3. Population

3.3.1. Source population

All HCWs working in pediatric unit of HFSUH

3.3.2. Study population

All HCWs working in the NICU of HFSUH who fulfill the inclusion criteria during the study period will be included.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion criteria

All health care workers having contact with neonates during the study period

3.4.2. Exclusion Criteria

HCW's who are on leave during data collection.

3.5. Sample size Determination and sampling procedures

3.5.1. Sample size determination

Single population proportion formula is used to calculate sample size by considering P= 0.206 from the previous study conducted in Debre Berhan referral hospital (Kolola and Gezahegn 2017) at 95% confidence interval) and 5% of the degree of precision. The sample calculated with the following formula:

$$N = \frac{z^2 p (1-p)}{d^2}, \text{ where}$$

N= minimal sample size required

z= 1.96 (normal deviate corresponding to 95% confidence interval)

d= degree of precision, P= proportion hand hygiene practice

$$\text{Thus, } N = \frac{1.96^2 \times 0.206 \times 0.794}{(0.05)^2} = 251$$

By adding 10% non-response rate, the final sample size will be 276 HH opportunities.

For the second objective: Double population proportion formula will be used to determine the sample size. Accordingly, the Sample size will be calculated for some of the associated factors

obtained from literatures by using the Stat calc of Open Epi statistical software version 2.3 with the following assumptions: Confidence level = 95%, Power = 80%, the ratio of unexposed to exposed almost equivalent to 1

Table 1:Sample size determination for second objective of hand hygiene practice and associated factors among HCWs in NICU

Factor	Factor associated with hand hygiene		AOR, 95% CI	Sample size with 10%	Reference
	Exposed %	Non-exposed %			
Knowledge of HH	19	7.6	3.8(1.6-8.97)	176	Dyson et al. 2019
Training of HH	23.3	6.2	2.6(1.21-5.62)	80	Tefera et al. 2014
Availability of ABHR In the ward	26.4	3.4	6.58(2.67-16.22)	38	Alemayehu et al. 2014

So, the maximum sample size considered for the study will be, the largest sample size 276.

3.6. Sampling procedure

Non probable sampling technique will be applied to obtain hand hygiene opportunities

3.7. Data collection Method

3.7.1 Data collection Tools

Two tools will be used to collect data. First Observational checklist adapted from WHO observational tool will be used to assess hand hygiene practice (WHO,2009).

It contains hand hygiene practice based on WHO 5 indications for hand hygiene. The tool is based on the principle that when HCWs do any patient care activity and procedure the HCW has a “hand hygiene opportunity”(O).When HCW responds to this opportunity by either washing hand with soap and water (HW) or rub hand by alcohol (HR) a HCW has hand hygiene action (HHA), if not he/she missed action (M). An observer records opportunities observed (O) and hand hygiene action (HA); finally HH compliance will be calculated as a percentage, (i.e., HH compliance % = (observed hand hygiene action (HHA) ÷ hand hygiene opportunity (O)) × 100).

Second self-administered questionnaire which contains three parts will be used. Part I is about socio demographic characteristics of respondents. Part II contains 28 Knowledge questions that are adapted from WHO Hand Hygiene Knowledge Questionnaire for health workers (WHO,

2016) and Part III includes questions which contain questions related to associate factors other than knowledge.

3.7.2. Data Collectors

The data will be collected by three public health officer working in the adult outpatient department of the hospital, who will be trained to observe hand hygiene practice before actual field work and principal investigator will supervised the activities of data collectors.

3.7.3. Data collection procedure

Data collection will be done in two phases, first the HCWs will be observed for HH practice by direct observation, to decrease bias from the behavioral change of the staff, the observer will come to the unit at random time within the shifts (morning, after noon and night s) and will act as unobtrusively as much as possible. The observer recorded only actions that could be seen and don't assume that action has taken place if it is not observed clearly. The main focus of the observer is the identification of the indication to hand hygiene according to the five moments of hand hygiene and whether the HCW comply or not. More importantly, the observers don't interfere with Health care activities and no observation is performed in emergency situations.

One observation session will last for 20-30 minute and can be repeated if 3-4 HCWs needed, can be observed at a time but not more than.

Then in the second phase, during the last week of study period, self- administered questionnaires will be given to the HCWs during each shift. The questionnaire will be given for the respondents 1 hrs before the end of the regular working hours and the data collectors collect the questionnaires before the respondent leave the unit by completing their shift work. For HCWs who are on the night shift the questionnaire will be given at 8:00 pm at night and collected back after 1 hr

3.8. Variables of the Study

3.8.1. Outcome Variable

Hand hygiene practice

3.8.2 Independent variables

Socio demographic factors: Age, Sex, Work experience, professional category

Organizational factors: Availability of soap and water, Availability of ABHR, Availability of sink with running water, presence of infection prevention committee,

Individual Factor: knowledge, training, business, forgetfulness, skin irritation by ABHR, type of patient contact

3.9. Operational Definition/Terms

Hand hygiene opportunity: Time span between departure and arrival of hand-to-surface exposure of a risk-prone hand transition that requires a single hand hygiene action motivated by one or more hand hygiene indications; which serves as a denominator for the calculation of compliance. A missed opportunity corresponds to an opportunity for hand hygiene that was not met by a hand hygiene action(WHO, 2009).

Clean/aseptic procedure; Any care activity that implies a direct or indirect contact with a mucous membrane, non-intact skin or an invasive medical device. During such a procedure no germ should be transmitted.

Body fluids: Any substance/fluid from the body:- blood, excreted, urine, stools, vomit, meconium, lochia, secreted: saliva, mucous, sperm, milk and colostrum, tears, wax, caseosa (until first bath), trans-/exsudate: pleural fluid, cerebrospinal fluid, ascites fluid, synovial fluid, amniotic fluid, pus, with the exception of sweat - by extension, any biological samples taken from the body (including tissue sample, placenta, cytological sample, organ, bone marrow)

Patient surrounding: the space where patient lied and its surrounding can be touched by the patients and HCPs at any time whenever giving a care of a patient.

Health Care Worker: health professionals who provide care and have a direct contact to the patients (physicians, nurses and medical interns)

3.10. Data Quality Control

The following was attempted to assure the data quality.. Two days training will be provided to the data collectors and supervisors on the data collection tool and the data collection procedures. Then the questionnaire will be pretested on 5% of the sample size out of the study area to ensure its validity. Data collectors will be supervised closely by the supervisors and the principal investigators. Completeness of each observation check list and questionnaire will be checked by the principal investigator and the supervisors on daylily basis. Double data entry will be done by two data clerks and consistency of the entered data will be cross checked by comparing the two separately entered data on EPI Data. Family multivariate analysis will be run in the binary logistic regression model to control the confounding factors

3.11. Data process and Analysis

The collected data will be checked for its completeness and cleaned before entry into computer. Then, data will be coded, cleaned, edited, and entered into EPI data version 3.1 to minimize logical errors and design skipping patterns. Then, the data will be exported to SPSS window version 22 for analysis. Descriptive analysis will be done by computing proportions and summary statistics. Then, the information will be presented by using simple frequencies, summary measures, tables and figures. Bi-variate analysis and multivariate analysis will be done to see the association between each independent variables and outcome variables by using binary logistic regression. The assumption for binary logistic regression will be checked. The goodness of fit will be checked by Hosmer-Lemeshow statistic and omnibus testes. All variables with $p < 0.25$ in the Bi variate analysis will be included in the final model of multivariate analysis in order to control all possible confounders. Multico-linearity test will be carried out to see the correlation between independent variables by using the standard error and collinearity statistics (variance inflation factors > 10 and standard error > 2 will be considered as suggestive of existence of multi co-linearity). The direction and strength statistical association will be measured by odd ratio with 95% CI. Adjusted odds ratio along with 95% CI will be estimated to identify predictors for Hand hygiene practices by using multivariate analysis in binary logistic regression. In this study, $P\text{-value} < 0.05$ will be considered to declare a result statistically significant

3.12. Ethical consideration

Before starting the data collection process, the study protocol will be approved by the College of Health and Medical Sciences the Institutional HEALTH Research Ethics Review Committee (IHRERC). Official letters of co-operation will be submitted to HFSUH and concerned bodies to obtain their co-operation and consent in facilitating the study. After getting informed, voluntary, written and signed consent from the hospital head, information on the study will be explained to the participants, including the procedures, potential risks, and benefits of the study. The respondents will be informed of their right to refuse or decline participation in the study at any time and refusing to participate in the study will not affect them. Informed voluntary written and signed consent will be obtained from all respondents before the study. Participants' confidentiality of information will be assured by excluding names and identifiers in the questionnaire.

3.13. Expected outcome

The hand hygiene compliance of health care worker is expected to be low because of high patient follow to the study area, as the neonatal intensive care unit is the only referral unit in the region

3.14. Result disseminations

After conducting the research, the result of this study will be presented in the department's research defense day and also submitted. The results will be presented to the scientific community in the College of Health Science, HU. The results of the study will also be presented in national and international conferences and will be given for peer review for publication.

4 Work plan

Table 2 : Work plan of hand hygiene practice and its associated factors among health care workers in neonatal unit of Hiwot Fana Specialized University Hospital, 2020

S. No	Activities	Responsible body/fes	2019						2020		
			July	Augus	Sep	Octo	Nov	Dec	Jan	Feb	Mar
1	Finalizing data collection instruments	PIs									
2	Obtaining Ethical Review	PIs									
3	Duplication of check list										
4	Data collection period	PIs									
	Data management(entry clearance)	PIs									
5	Data analysis and writing final research report	PIs									
6	Preparing and submission of manuscript										

5. BUDGET BREAKDOWN

Table 3: Budget breakdown of hand hygiene practice and its associated factors among health care workers in neonatal unit of Hiwot Fana Specialized University Hospital, 2020

Material	Units	Unit price	Number	Total
Duplication paper	Ream	130	04	530
Pen	Number	5	10	50
Binder	Number	40	04	140
Printer Ink	Number	2500	01	2500
Flip chart	Number	150	01	150
Sub-total				3370
Personnel cost				
	Number	Rate per day	Number of days	Total
Data collector	03	172	30	15480
Supervisor	1	198	17	3366
Telephone cost	10	100	3	300
Subtotal				19,146
Data Collector and supervisor Training				
Trainer	01	198	2	396
Trainees	04	172	2	1376
Refreshment				600
Subtotal				2372
Total				24888

Budget Summary

S. No.	Item	Budget in Birr	Remark
1	Personal cost	19,146	
2	Stationary cost	3370	
3	Data collector training	2372	
	Grand Total	24888	

SOURCE: Haramaya University.

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7. Annex

Annex I. Information Sheet and Informed Voluntary Consent Form for Hospital Heads

My name is _____, I am working as data collector for the study being conducted in this Institution by Dr Ahmed Mohammed Husen, year III pediatric resident at Haramaya University College of Health and Medical Sciences. I kindly request you to lend me attention to explain you about the study and being selected as the study participant.

Title of the study: Hand hygiene practice among health care workers in neonatal unit of Hiwot fana specialized university hospital, Eastern Ethiopia.

Purpose: The findings of this study can be of a paramount importance for your institution to know the level of practice of hand hygiene and to point out major factors that hinder the practice and take corrective actions toward the factors to increase the level of practice so as to reduce cross contamination that occur between hospital environment, patient and health care workers and to reduce prevalence of hospital acquired infection by adhering to correct practice of hand hygiene.

The study is requirements for the partial fulfillment of the specialty certificate in pediatrics and child health

Procedure: I will observe the health care workers (physicians, nurses, and medical interns) when they are practicing hand hygiene using observational checklist which will last 20-30 minute for data collection period of four weeks which will be helpful to know correct practice and at the end of the observational period (i.e. at fourth week of data collection period) the health care workers are requested to respond for self-administered questionnaires to provide me with pertinent data that is helpful for the study. There are 16 questions to answer with their possible choices. The questionnaire will take about 20-30 minutes.

Risk and benefits: By participating in this study you may feel that it has some discomfort specially on wasting time of employees (about 20-30 minutes) but this may not be too much comparing its potential benefits it contributes for your institution on identification of factors that

hinder good performance of hand hygiene practice and intervene accordingly to decrease prevalence of hospital acquired infection and increase quality care provided by health care workers.

Confidentiality and Anonymity: The information that we will collect from individual health care workers for this study will be kept confidential. Information collected during the study will be stored in a file, which will not have individual name on it, but a code number assigned to it. Which number belongs to which name will be kept under lock and key, and it will not be revealed to anyone except the principal investigator.

Rights: permission to this study is on voluntary basis. You have the full right to permit or not for the study. You have also the full right to terminate this study at any time if you get something wrong with the study.

Persons to contact: If there are any questions about study, you can contact by any of the following addresses.

1. Principal investigator: Dr Ahmed Mohammed

Mobile number +251 984569069, E-mail: ahime111@gmail.com

2. Institutional Health Research Ethics Review committee:

Office phone: 0256661899: P.O.BOX: 235, Harar

Declaration of informed voluntary consent: I have heard/read the information sheet and voluntary consent form for hospital heads. I have clearly understood the purpose of research, procedures, the risks and benefits, issue of confidentiality, the right of participating and contact address for any queries. I have been given opportunity to ask questions for things that are unclear. I was informed my rights whether to continue or terminate the study. Therefore I declare my voluntary consent to permit this study to be conducted in _____ with my signature as indicated below.

Name and signature of head of hospital _____

Annex II. Participant information sheet and informed voluntary consent form

My name is _____. I am working as data collector for the study being conducted in this facility by Dr Ahmed Mohammed Husen, year 3 pediatric resident at Haramaya University, College of Health and medical Sciences. I kindly request you to give me your attention to explain you about the participant information to obtain your consent.

The study title: Hand Hygiene Practice And Its Associated Factors among health care workers in neonatal intensive unit of Hiwot fana specialized university hospital, East Ethiopia

Aim/Purpose of the study: The findings of this study can be of a paramount importance for your institution to know the level of practice of hand hygiene and to point out major factors that hinder the practice and take corrective actions toward the factors to increase the level of practice so as to reduce cross contamination that occur between hospital environment, patient and health care worker and to reduce prevalence of hospital acquired infection by adhering to correct practice of hand hygiene.

The study is requirements for the partial fulfillment of the specialty certificate in pediatrics and child health

Procedure and duration: I want you to spend some of your time to fill the questionnaires below by providing me the pertinent information. There are 16 questions that you can fill by your own. There are choices for questions and you are requested to write their number in front of column named code. If your answer is not found among the choices you can write any possible answer in space in front of the questions.

Risk and benefits: The risk of being participated in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for your institution at large and unit specifically on identification of factors that hinder good performance of hand hygiene practice and intervene accordingly to decrease prevalence of hospital acquired infection and increase quality care provided by health care workers.

Confidentiality: The data you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study population and will not reflect anything particular of individual person. The questionnaire will be

coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights: Participation in this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefit which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

Contact address: If there are any questions or enquires any time about the study or the procedures, please contact me:

1. Name of principal investigator:- Dr Ahmed Mohammed Husen,
Mobile number (+251)-984569069
Email Address: ahime111@gmail.com
2. Institutional Health Research Ethics Review Committee:
Office phone: 0256661899: P.O.BOX: 235, Harar

Informed and voluntary consent Declaration form for interview questioner

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues to confidentiality, the rights of participating and contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to stop the study at any time or not to answer any question that I do not want.

Therefore, I declare my voluntary consent to this study to be conducted with my initials (signature) as indicated below.

Name and signature of the participant: _____ Signature of data collector:

_____ Date: _____

Annex III. Health Care Worker Hand Hygiene Practice Observation Format

Date _____, Observation start/End time _____/_____

Prof.cat			Prof.cat			Prof.cat		
physician			Nurses			medical interns		
N°			N°			N°		
Opp.	Indications	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action
1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves
2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves
3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves
4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves
5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves	5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="radio"/> gloves

NB: OPP-opportunity, **bef-pat:** before patient contact, **bef-asept:**before aseptic technique, **aft-b.f:** after body fluid, **aft-pat.:** after patient contact, **aft.p.surr:** after patient surrounding

HR: hand rubbing, HW: hand washing,

Annex IV: Self administered questioner

Study questionnaire to Determine Hand hygiene practice among health care workers in neonatal intensive care unit of Hiwot fana specialized hospital, Eastern Ethiopia.

Instruction: Please put your response number in the adjacent column named “Code”

Part I .Socio demographic characteristics

S/N	Question	Response	Code
1	Sex	M	1
		F	2
2	Age		
4	Professional category	Pediatrician	
		Resident	
		Nurse	
		Medical intern	

Part II .Knowledge about hand hygiene

S/N	Questions	Response	Code
5	Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (circle one answer only)	Health-care workers’ hands when not clean	1
		Air circulating in the hospital	2
		Patients’ exposure to colonised surfaces (i.e.,beds, chairs, tables, floors)	3
		Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.)	4

		between patients	
6	What is the most frequent source of germs responsible for health care-associated infections? (circle one answer only)	Germs already present on or within the patient	1
		The hospital environment	2
7	Which of the following hand hygiene actions prevents transmission of germs to the patient?		
	A) Before touching a patient	YES	1
		NO	2
	B) Immediately after a risk of body fluid exposure	YES	1
		NO	2
	C)After exposure to the immediate surroundings of a patient	YES	1
		NO	2
	D) Immediately before a clean/aseptic procedure e)	YES	1
		NO	2
	E)Before touching a patient	YES	1
		NO	2
	8	What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (circle one answer only)	20 SECOND
3 SECOND			2
1 SECOND			3
10SECOND			4
9	Which of the following hand hygiene actions prevents transmission of germs to the patient?		
	Before touching a patient	YES	1
		NO	2
	b) Immediately after a risk of body fluid exposure	YES	1
		NO	2
	C)After exposure to the immediate surroundings of a patient	YES	1
		NO	2
	D) Immediately before a clean/aseptic	YES	1

	procedure e)	NO	2
	E)Before touching a patient	YES	1
		NO	2
10	Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true		
	A)Hand rubbing is more rapid for hand cleansing than hand washing	TRUE	1
		FALSE	2
	B)Hand rubbing causes skin dryness more than hand washing	TRUE	1
		FALSE	2
	C)Hand rubbing is more effective against germs than hand washing	TRUE	1
		FALSE	2
	D)Hand washing and hand rubbing are recommended to be performed in sequence	TRUE	1
		FALSE	2
11	Which type of hand hygiene method is required in the following situations?		
	a) Before palpation of the abdomen	Rubbing	1
		Washing	2
		None	3
	Before giving an injection	Rubing	1
		Washing	2
		None	3
	After emptying a bedpan	Rubing	1
		Washing	2
		None	3
	After removing examination gloves	Rubing	1
		Washing	2
		None	3
	After making a patient's bed	Rubing	1
		Washing	2

		None	3
	After visible exposure to blood	Rubing	1
		Washing	2
		None	3
12	Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?		
	A) Wearing jewellery	YES	1
		NO	2
	B) Damaged skin	YES	1
		NO	2
	C) Artificial fingernails	YES	1
		NO	2
	D) Regular use of a hand cream	YES	1
		NO	2
13	Did you receive formal training in hand hygiene in the last three years?	YES	1
		NO	2
14	Do you routinely use an alcohol-based hand rub for hand hygiene? Always Intermittently	Always	1
		Intermittently	2
		Rarely	3
		Never	4
Part III Other Barriers of hand hygiene practice			
15	Do you know the presence of Infection prevention committee in the hospital?	YES	1
		NO	2
16	Which of the following factors you think caused for poor adherence to recommended hand hygiene practices (Circle possible factors/ choosing more than	Irritations and dryness Hand washing agents	1
		Shortage of sinks/ inconveniently located	2

one choice is possible)	Lack of soap and hand washing agents	3
	Often too busy or insufficient time	4
	Wearing of gloves	5
	Lack of knowledge, experience and education	6
	Forgetfulness	7
	Others.....	8

Annexe V: Curriculum Vitae (CV)

1. Personal data

Name: Dr.Ahmed Mohammed

Date of birth: 1991 G.C

Place of birth: chiro woreda, East Hararghe

Sex: Male

Marital status.....married

Nationality.....Ethiopian

Address.....Harar,

TEL—0919231926

E-mail ahime111@gmail.com

2. Educational background

2.1 . Graduated from chercher preparatory School

2.2 Graduated from Haramaya University with Doctoral degree in 2014G.C with GPA of 3.65

2.3 .Year III resident in Pediatric speciality training

3. Work Experience

3.1 Work as general physician at Haramaya Hospital for two year

3.2 Work as Lecturer at Haramaya university school of medicine

4. Language proficiency

Language	Listening	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent	Excellent
Amharic	Excellent	Excellent	Excellent	Excellent
Afaan oromo	Excellent	Excellent	Excellent	Excellent

5. Short term Training

5.1 Basic training HAART, MDR TB, Malaria, ETAT

6.References

Dr. Tekabe Abdosh (MD)...0911404990

Dr. Henan Abdurrahman(MD)...0911006036

Annex VI: Approval sheet

**HARAMAYA UNIVERSITY
POST GRADUATE PROGRAM DIRECTORATE**

Submitted by:

_____	_____	_____
Name of Student	Signature	Date

Approved by:

1. _____	_____	_____
Name of Major Advisor	Signature	Date

2. _____	_____	_____
Name of Co-Advisors	Signature	Date

3. _____	_____	_____
Research thematic area leader	Signature	Date

4. _____	_____	_____
Chairman, DGC/ SGS	Signature	Date

5 _____	_____	_____
PGPD	Signature	Date