ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE

DEPARTMENT OF ANESTHESIOLOGY, CRITICAL CARE AND PAIN MEDICINE

ADHERENCE OF HEALTH CARE WORKERS TO HAND HYGIENE AT INTENSIVE CARE UNIT TIKUR ANBESA SPECIALIZED HOSPITAL ,ADDIS ABABA,2024/25, OBSERVATIONAL STUDY

THE THESIS IS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, DEPARTMENT OF ANESTHESIOLOGY, CRITICAL CARE AND PAIN MEDICINE FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS OF A SPECIALTY CERTIFICATE IN ANESTHESIOLOGY, CRITICAL CARE AND PAIN MEDICINE.

ADHERENCE OF HEALTH CARE WORKERS TO HAND HYGIENE AT INTENSIVE CARE UNIT TIKUR ANBESA SPECIALIZED HOSPITAL ,ADDIS ABABA,2024/25, OBSERVATIONAL STUDY

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Abbreviations and Acronyms

ABHR alcohol-based hand rub

AOR Adjusted Odd Ratio

CI Confidence Interval

HAIs Healthcare associated infections

HCWs Health care workers

HH Hand hygiene

ICU Intensive care unit

IPC Infection prevention and control

OR Odd Ratio

PPE personal protective equipment

WHO World Health Organization

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Abstract

Background: Hand hygiene (HH) is recognized as the single most effective strategy for preventing health care–associated infections. In developing countries, data on hand hygiene compliance is available only for few health-care facilities. This study aimed to assess hand hygiene adherence of health-care workers working at ICU of TASH, Addis Ababa, Ethiopia.

Methods: This study employed the WHO hand hygiene observation method. Direct observation of the health care workers (HCWs) was conducted using an observation record form in five Intensive care units. Trained observers watched HCWs while they had direct contact with patients or their surroundings, and the observers then recorded all possible hand hygiene opportunities and hand hygiene actions with sample of at least 200 opportunities per ICU. HH compliance was percentage of the number of times hand hygiene action to the total number of opportunities for hand hygiene.

Results: A total of 1016 hand hygiene opportunities with 227 HH actions were observed during the study. Overall HH compliance was 22.3% . Doctors had better HH compliance than Nurses and adhere more at morning. Levels of compliance were lower before patient contact (3.9%), before an aseptic procedure (6.3%) and after contact with patient surroundings (16.8%), whereas better levels of compliance were found after body fluid exposure (51.4%) and after patient contact (32.7%).

Conclusion: HH compliance of HCWs was found to be low in ICU of TASH . Compliance with indications that protect patients from infection was lower than that protect the HCWs. The findings of this study indicate that HH compliance needs further improvement.

Keywords: Hand hygiene compliance, Direct observation method, Health-care worker, ICU, TASH, WHO

1. Introduction

1.1 Background

Infection prevention and control (IPC) is a universally important component of all health systems and affects the health and safety of both people who use services and those who provide them. Healthcare associated infections (HAIs) are caused by environmental pathogens or patient's endogenous flora (1). Furthermore, the use of invasive diagnostic and therapeutic procedures is an additional risk factors contributing to HAIs. In intensive care unit (ICU), these risk factors are very common, making ICUs the highest incidence of HAI (2).

Patients in ICUs are at higher risk of acquiring HAIs than patients in the general ward. HAIs have been associated with an increase in morbidity, mortality, length of ICU stays and costs (3). Rates of HAIs in the ICU may be as high as 37% (4). According to the World Health Organization (WHO), ICU-related HAIs are two to three times higher in lower income countries than in higher-income ones (5). The frequent movement of healthcare workers between patients in the ICU is a likely reason for the increased rates of cross infection among critically ill patients (6).

Health care workers (HCWs) hands are the more frequent carriers for the responsible microorganisms. The transmission of microorganisms from the hands of hospital personnel is a huge source of infections and these can be readily prevented by staff conforming with laid down hand washing protocols. This is because unwashed personnel's hands are the most common means for the transmission of pathogens from patient to patient and within the healthcare environment (7).

Hand hygiene is therefore the easiest means for preventing the spread of pathogens with huge antimicrobial resistance potential and reducing rates of healthcare-associated infections. For these reasons, infections are often associated to inadequate hand hygiene practices among health care workers and poor clinical conditions during hospitalization (8). Hand cleansing and other hygiene measures have been as one of the most effective measures in combating

the transmission of HAIs (9). However, despite implementation of multiple interventions over the years, compliance with hygiene practices among healthcare workers remains suboptimal (10-11).

In recent years, the use of an alcohol based hand rub has superseded the use of soap and water in most instances where hand hygiene is required (12). Other measures, including the appropriate use of personal protective equipment (PPE) such as disposable surgical gloves and plastic aprons and keeping the hands, wrists and forearms free ('bare below the elbows') during contact with patients or their surroundings, have also been proven to limit the spread of micro-organisms in the healthcare setting (13-14).

WHO) in 2009 recommended the five moments of hand hygiene: (1) before patient contact, (2) before an aseptic task, (3) after body fluid exposure risk, (4) after patient contact, and (5) after contact with patient surroundings. Hand hygiene opportunities represent instances during patient care wherein hand hygiene should be performed due to the presence at least one of these indications. Understandably, there may be instances wherein more than one hand hygiene indication exists for a given opportunity (15).

Nevertheless, research has shown that the majority of infections are preventable through interventions based on effectiveness evidences (16). Among those evidence-based intervention Hand hygiene (HH) practice is considered a cornerstone in the prevention and control of healthcare-associated infections and antimicrobial-resistant pathogens (17-18). It has been proved effective in different healthcare settings (19). Many studies have reported unacceptable hand hygiene practices and challenges in sustaining healthcare workers' (HCWs) compliance levels (20-21)

Direct observation of the hand hygiene behavior of health care workers is considered the "Gold Standard"(22). It provides quantitative and qualitative information about when and why failures in hand hygiene occur and distinguish between hand hygiene practiced by different types of health care workers (22-24).

1.2 Statement of the problem

Maintaining hand hygiene compliance poses a significant challenge, and numerous studies have demonstrated that HCWs exhibit inadequate performance and express limited acceptance of the practice (25-26). According to the WHO, less than 50% of HCWs and less than 10% of institutions with heavy workloads adhere to hand hygiene regulations (27).

Globally, some estimates suggest that hand hygiene adherence is approximately 40% (28-29). The rate of compliance with hand washing was significantly lower among doctors (32%) compared to nurses (48%), and lower before (21%) compared to after (47%) patient interaction (30-31). Although the level of hand hygiene adherence by HCWs has historically been poor, using effective measures and interventions can greatly improve compliance with hand hygiene. A study found that when an institution makes a concerted effort to improve appropriate procedures, adherence rates increase to 65% (32). Also, it is proven fact that, organisms that cause nosocomial infections are most commonly transmitted by the hands of healthcare workers (33).

Despite the established importance of hand hygiene in preventing infections, adherence rates among HCWs in ICUs remain suboptimal, which puts patients at increased risk of acquiring infections. In an ICU setting, where patients are critically ill and have weakened immune systems, the likelihood of infection transmission is heightened (27).

The crowded nature of ICUs, the frequent handling of invasive devices, and the urgent and intensive nature of care make it essential for health workers to strictly follow hand hygiene protocols. However, studies show that a considerable proportion of health workers, including doctors, nurses, and support staff, often fail to adhere to these practices. Furthermore, non-compliance with hand hygiene can undermine the credibility of healthcare institutions and reduce the overall quality of care provided to patients. Therefore, it is crucial to investigate the factors affecting the adherence of health workers to hand hygiene protocols in the ICU.

1.3 Significance of the study

The significance of studying the adherence of health workers to hand hygiene practices in intensive Care Units lies in its direct impact on patient safety, infection control, and the overall quality of healthcare delivery. This study will provide insight into the current adherence levels of health workers to hand hygiene protocols, which can lead to the identification of gaps and barriers that hinder compliance. Addressing these gaps can reduce the incidence of HAIs, thereby improving patient outcomes and reducing mortality rates in the ICU.

This study will help healthcare institutions understand how to improve adherence, which will enhance the overall quality of care provided to patients in critical settings. By improving hand hygiene adherence, hospitals can significantly reduce the incidence of these infections, thereby lowering treatment costs.

Identifying the factors influencing non-compliance with hand hygiene practices can guide the development of targeted interventions and better enforcement of hand hygiene protocols. Addressing these gaps will lead to better-informed healthcare workers who are more likely to follow hand hygiene protocols consistently.

Hand hygiene is a globally recognized strategy for reducing the spread of infectious diseases. By improving adherence to hand hygiene in ICUs. The finding holds significant potential for improving infection prevention, enhancing patient safety, reducing healthcare costs, and fostering a culture of continuous improvement within ICU settings. It can serve as a valuable resource for healthcare institutions aiming to improve hand hygiene practices, leading to better outcomes for both patients and healthcare providers

2. Literature review

A observational study done at tertiary care Hospital in India at ICU and other acute care setting with total 4301 opportunities, HH actions were performed in 2312 (53.74%) opportunities. In ICU, of 2053 opportunities, HH actions were performed in 1169 (56.94%) opportunities, which was better than other acute care settings where HH was performed in only 50.8% occasions. Out of 1989 missed opportunities where HH was not performed, in 525 occasions (26.39%) the gloves were worn (34)

A observational study done in a tertiary health care hospital in Kathmandu, Nepal at 2021.A total of 1068 hand hygiene opportunities were observed among 260 healthcare workers. The overall hand hygiene compliance was 30%, and the compliance was observed differently among the health care workers, where compliance of hand hygiene for doctors, nurses, and paramedics were 37%,35%,and23%,respectively. Hand hygiene compliance, after body fluid exposure, was found to be higher (83%), followed by after touching the patients' surroundings(79%), and only 11% compliance was found before touching the patient (35).

Hand Hygiene Adherence Among Health Care Workers at Japanese Hospitals found that a total of 3545 health care worker–patient observations, appropriate hand hygiene practice was performed in 677 (overall adherence, 19%. Subgroup rates of hand hygiene adherence were 15% among physicians and 23% among nurses. The ranges of adherence were 11% to 25% between hospitals and 11% to 31% between units (36).

A observational study done on hand hygiene compliance among healthcare workers in an accredited tertiary care hospital in India revealed that the overall compliance as per WHO Guidelines was 78%. Nurses had an adherence rate of 63%; allied staff adherence was 86.5%. Compliance was 93% after patient contact versus 63% before patient contact. Nurses 'compliance before aseptic procedures was lowest at 39%. 92% of health care workers were aware(37).

The study done on Changes in hand hygiene compliance after a multimodal intervention among health-care workers from intensive care units in Southwestern Saudi Arabia revealed that the overall, hand hygiene compliance increased significantly from 60.8% (95% CI: 57.9–63.6%) before the intervention to reach 86.4% post-intervention (38).

A observational study done at trauma hospital in Iraq Kurdistan at 2018 at emergency, ICU and acute care ward of 149health care workers with total of 622 opportunities shows over compliance of 6.8%. compliance is lower at ER (1.0%), than ICU (8.1%) and acute care ward (11.1%) and no significance difference in terms of profession (39).

A study done on Hand hygiene compliance among healthcare workers in Ghana's health care institutions found that hand hygiene compliance with moments of hand hygiene was 51% (40).

An 24 hour observational study of hand hygiene compliance of surgical healthcare workers in a Nigerian teaching hospital at 2010, Among HCWs of 659 opportunities, compliance was 47% for doctors, 75% for nurses, 78% for allied health professionals, and 59% for ancillary and other staff. Hand hygiene compliance varied depending on which of the five moments of hygiene, with compliance before an aseptic task being 100% (3/3); after body fluid exposure 93% (86/93); after patient contact 80% (114/142); before patient contact 68% (196/290); and after contact with surroundings 50% (65/129). Lower levels of compliance were found for HCWs working during the early shift [41].

A study done in south Africa on Compliance with hygiene practices among healthcare workers in the intensive care unit found that a total of 745 hygiene opportunities were observed. Of the 156 opportunities where hand washing with soap and water was indicated (20.9%), compliance was noted in 89 cases (57.1%), while an alcohol-based hand rub was inappropriately used in 34 cases (21.8%) and no hand hygiene was performed in the remaining 33 cases (21.1%). Of the 589 opportunities where an alcohol-based hand-rub was indicated, it was used in 312 cases (53.0%) (42).

Observations were conducted in six ICUs of Egypt before intervention (March to April 2017) and after the intervention (July to August 2017). The study included 608 opportunities (observations) among 177 HCWs collected before and 673 opportunities among 163 HCWs collected after the intervention. Overall HH compliance increased significantly from 30.9 (95% CI: 27.2-34.6%) before intervention to 69.5 (95% CI: 65.2-72.6%) post intervention; with the highest HH compliance rate among nurses compared to physicians and workers (P = 0.001). Significantly higher HH compliance rates were observed after body fluid exposure,

before aseptic procedures, and after patient contact compared to before patient contact and after patient surrounding contact (P = 0.001)(43).

An observational study of hand hygiene compliance among 261 health care workers in Debre Berhan referral hospital, Ethiopia found that a total of 917 hand hygiene opportunities were observed during the study. Overall HH compliance was 22.0%. that Levels of compliance were lower before patient contact (2.4%), before an aseptic procedure (3.6%), and after contact with patient surroundings (3.3%), whereas better levels of compliance were found after body fluid exposure (75.8%) and after patient contact(42.8%, and no significant difference in profession and shift (44).

3. Objectives

3.1 General Objective

Assessment of adherence and determinants of health care workers to hand hygiene at intensive care units of TASH , Addis Ababa.

3.2 Specific objectives

To determine the health workers hand hygiene Adherence rate at intensive care unit of TASH, Addis Ababa.

To determine adherence of HCWs to WHO hand hygiene moments

To assess determinants for hand hygiene adherence among HCWs

4 Methods and materials

4.1 Study design and period

An covert based observational study was conducted at intensive care units (SICU, MICU, CICU, PICU , NICU) at TASH, Addis Ababa, Ethiopia at month of March 2025.

4.2 Study area

The study was conducted at TASH, which is located in the Central part of Addis Ababa City Administration, the capital of Ethiopia. TASH is a tertiary hospital that provides services for referral cases from other specialized referral hospitals throughout the country.

TASH, has 5 intensive care units; surgical ICU, medical ICU, cardiac ICU, pediatric ICU and neonatal ICU service provided by 15 Anesthesiologists,1 Intensivist, 5 Pulmonologists, 6 Cardiologists, 1 Neonatologist, Fellows(Cardiac, Pediatric Intensivist, Pulmonology), Residents (anesthesiology, internal medicine, pediatric, emergency and surgical attaching) and 133 nurses.

Intensive care units; Surgical ICU has 12 beds with 4 separate room, Medical ICU has 6 beds with 2 separate room, Cardiac ICU has 7 beds with 2 separate room, Pediatric ICU has 4 beds, and Neonatal ICU has more than 30 beds with 6 separate rooms.

4.3 Population

4.3.1 Source population

All health care providers who worked in the study setting.

4.3.2 Study population

All nurses and physicians who worked in the intensive care unit during the data collection period.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria: all nurses and physicians

4.4.2 Exclusion criteria: none

4.5 Sample size determination and technique

4.5.1 Sample size determination

minimum of 200 HH opportunities per unit

4.5.2 Sampling technique

All observed HH opportunities during period of collection

4.6 Study variable

4.6.1 Dependent variables

Hand hygiene adherence/compliance rate, overall and to each WHO HH moments

4.6.2 Independent variable

Professional category

Unit/location

Shift/morning vs. afternoon

4.7 .Operational definition

WHO Hand Hygiene 5 Moments/Opportunity; specific moments or situations when healthcare care workers should perform hand hygiene to prevents spread of infections(before patient contact, before clean/aseptic procedure , after body fluid exposure, after touching a patient , after touching patient surroundings).

Hand hygiene adherence; defined as hand washing with soap and water or the use of alcohol based hand rub, in accordance with the 'five moments for hand hygiene' concept.

Missed hand hygiene ; neither hand washing with soap and water nor alcohol based hand rub has been performed.

Hand hygiene adherence rate; percentage of hand hygiene action to hand hygiene opportunities.

WHO HH adherence; Set target of over 90% to effectively prevent infections.

4.8 Data collection, tools, and procedure

Data was collected using WHO hand hygiene observation form. Observer was trained about the form, the 5 HH moments/opportunity and specific procedure and data collection and environment management before data collection. Two shift observations were done over three weeks at week days from 8 AM-4PM for 2-3 hour per day per unit with different observation session. Data was collected for minimum of 200 opportunities per unit.

4.9 Data quality control

Trained single observer underwent covert observation using Google form and checked for completeness frequently.

4.10 Data processing and analysis

All responses were coded, entered, and analyzed using SPSS Version 27. Data was analyzed for overall compliance and compliance for 5 HH moments and regression analysis was done for HCW category, unit, shift with statically significant, p-value <0.05.

4.11 Ethical consideration

The research was conducted after obtaining ethical clearance and approval from the Department of Anesthesiology, Critical Care, and Pain Medicine. An official support letter was written to TASH and permission for data collection was sought from the hospital authorities.Anonymity and Confidentiality was maintained (no identifier, coded observer, secured data , aggregate reporting).

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5. Result

5.1 Hand hygiene compliance

In this observational study, 1,016 hand hygiene opportunities were assessed to evaluate the hand hygiene compliance level of healthcare workers across various units at Tikur Anbessa Specialized Hospital. The overall hand hygiene compliance rate was found to be 22.3%

Table 1. Hand hygiene compliance of HCWs in working in ICU of TASH (N=1016)

characteristics	Hand hygiene opportunities	HH action	Compliance, %
Overall	1016	227	22.3
Working unit			
CICU	211	43	20.3
MICU	191	36	18.8
NICU	197	40	20.3
PICU	182	43	23.6
SICU	235	65	27.6
Time of data collection			
Morning	683	168	24.6
Afternoon	333	59	17.7
Profession			
Nurse	655	132	20.2
Doctor	361	95	26.3
Indication			
Before patient contact	230	9	3.9
Before clean aseptic procedure	175	11	6.3
After procedure body fluid exposure risk	175	90	51.4
After patient contact	275	90	32.7
After touching patient surroundings	161	27	16.8

5.2 The hand hygiene compliance to WHO 5 moments

HH compliance varied according to the five moments for hand hygiene. Levels of compliance were lower before patient contact (3.9%) and before clean aseptic procedure (6.3%) and Better levels of compliance were found after body fluid exposure (51.4%) and after patient contact (32.7%).

Table 2 Observed compliance of HCWs to WHO indicators in ICU (N=1016)

WHO five moments	Hand hygiene action	Opportunity	Compliance (%)
Before patient contact	9	230	3.9
Before clean aseptic procedure	11	175	6.3
After procedure body fluid exposure risk	90	175	51.4
After patient contact	90	275	32.7
After touch patient surroundings	27	161	16.8

5.3 Regression analysis of HCWs category, units, shift

Both bivariable and multivariable regression analyses were used and stastically significant was considered when p-value is less than 0.05

The results showed that working the morning shift was significantly associated with better hand hygiene compliance, with a 1.6 times higher likelihood of compliance compared to the afternoon shift (AOR: 1.572, 95% CI: 1.126–2.195).

In terms of profession, nurses were 30% less likely to comply with hand hygiene practices compared to physicians (AOR: 0.700, 95% CI: 0.515–0.950).

Additionally, working in the medical ICU was associated with approximately 40% lower compliance compared to other units (AOR: 0.589, 95% CI: 0.370–0.938).

Table 3: Regression analysis of independent variables

VARIABLES		Compliance		COR(95% CI)	P-value	AOR(95% CI)
		No	Yes			
Shift	Morning	515	168	1.515(1.088-2.109)	**0.008**	**1.572(1.126-2.195)**
	Afternoon	274	59	1		1
Occupation	Nurse	523	132	0.707(0.522-0.956)	**0.022**	**0.700(0.515-0.950)**
	Doctor	266	95	1		1
Working unit	CICU	168	43	0.669(0.431-1.040)	0.079	
	MICU	155	36	0.607(0.383-0.964)	**0.026**	**0.589(0.370-0.938)**
	NICU	157	40	0.666(0.425-1.045)	0.099	
	PICU	139	43	0.809(0.518-1.263)	0.298	
	SICU	170	65	1		1

6. Discussion

Adherence of HCWs to hand hygiene was low, far below compared to set standard of WHO for hand hygiene which is above 90% at intensive care units. Hand hygiene compliance was low across both professions, by shift and 5 HH moments.

In this study 1016 opportunity of hand hygiene was observed and 227 were perform the hand hygiene action with hand hygiene compliance of 22.3%. this finding was inline with the study done in Health Care Workers at Japanese Hospitals (19%) (36) and Debre Brhan Ethiopia (43). The finding of the study also higher than the study done in trauma hospital in Iraq Kurdistan (6.8%) (39). This finding was lower than the study done in tertiary care Hospital in India at ICU (53.7%) (34) and tertiary health care hospital in Kathmandu, Nepal (30%) (35). Possible reasons for lower compliance in this study, healthcare workers are often overburdened, which reduces time and priority for hand hygiene, lack of continuous training, hospital lacks system for monitoring hand hygiene practices and giving feedback.

The study also found that the five WHO moment of hand hygiene compliance was inconsistently low. Lower level of compliance were seen before patient contact (3.9%), before aseptic procedure (6.3%) , after touching patient surrounding(16.8%) and better level of compliance after risk of aseptic procedure (51.4%) and after touching the patient (32.7%). This study is in line with the study done in Debre Birhan (44), and lowers than the study done in Nigerian teaching hospital (41). Possible reason may be use of gloves leading to wrong sense of self protection and skipping of hand hygiene.

In this study, nurses have 30% less likely to adhere than physicians(AOR: 0.700, 95% CI: 0.515–0.950).In line with studies done in Nepal. in contrast to Japanese (36) and Nigeria(41). Possible reason may be HCWs awareness, and job duties may contribute to the observed differences.

7. Strengths and limitations

The strength of this study is that observation was covert, the HCWs were unaware of being observed to minimize “Hawthorne effect”.

Limitation of study; This study did not address why hand hygiene compliance was found to be low. This study was conducted in a single center; therefore, the generalizability to other settings might not be possible.

8. Recommendation

Hand hygiene compliance is low, far below WHO hand hygiene standard. Next step should focus on identifying factors for this low hand hygiene compliance.

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10. Annexes

10.1 Questionnaire

Addis Ababa University college health sciences, school of graduate studies, department of anesthesiology, critical care and pain medicine

Observation form to assess compliance of HCW to hand hygiene

Consent form for observer

Hi, good morning/afternoon.

My name is ----------, I am here on behalf of Dr. Adissu Mullu., a student in Addis Ababa University School of medicine, department of Anesthesiology, critical care and pain medicine. He is conducting a research thesis on "Adherence of health care workers to hand hygiene at critical care units at TASH, Addis Ababa ETHIOPIA at March, 2025 G.c". He has got formal permission from Addis Ababa University School of Medicine and TASH officials to conduct the study.

You are selected to participate in this study. There will be no direct benefit by participating in this study, but in the future information gathered by this study will helps policy makers, programmers and researchers to give appropriate attention on issues of interest and design specific treatment options.

The information will be kept confidential by using only code numbers and locking the data. Only the members of the study team will have the access to the non-coded data and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

If you need any further information or explanation regarding to the study, you can have this address to contact.

Would you be willing to participate. [put "x'' mark] Yes_____ No_____

Dr. Adissu Mullu +251941388618 adissumullu01@gmail.com

WHO hand hygiene observation form

Observer- Unit- Date- Start time- End time-	Professional category- a. Nurse b. physician Code- Hand hygiene facility- a. Alcohol dispenser b. .Water and soap c. both
Hand Hygiene Moments	**Hand hygiene action**
Before touching the patient Before clean/aseptic procedure After procedure or risk of exposure of body fluids After touching patient After touching patient surrounding	○ HR ○ HW ○ Missed • Glove, if missed

Total number of opportunities observed

Total number of hand hygiene performed-

Observer comment-

DECLARATION OF THE PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for the provision of required progress reports as per terms and conditions of the Department and College, in effect at the time of grant is forwarded as the result of this application. Name of the student _____ Date _____ Signature _____

APPROVAL OF THE ADVISORS: Name of the first advisor_____ Date _____ Signature _____ Name of the second advisor_____ Date._____ Signature _____