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**PRACTICE AND COMPLIANCE WITH WHO FIVE MOMENTS OF HAND HYGIENE
IN SURGICAL WARDS AT CHUK, A RWANDA TERTIARY HOSPITAL**

A dissertation submitted to college of medicine and health sciences, school of medicine and pharmacy in partial fulfillment for the requirements of award of a masters' degree in Anesthesia, University of Rwanda.

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Kigali, August/ 2021

DECLARATION

I, Dr HITAYEZU Donatien hereby declare that this dissertation entitled “PRACTICE AND COMPLIANCE WITH WHO FIVE MOMENTS OF HAND HYGIENE IN SURGICAL WARDS AT CHUK, A RWANDA TERTIARY HOSPITAL” represents my own and original research work and it has not been previously presented or submitted in any thesis or dissertation to this or any other institution.

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We, hereby declare that this dissertation has been submitted with my approval as the supervisor:

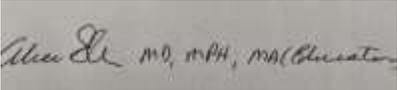
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ABSTRACT

Background

The hand hygiene was considered as a simple, cost effective recommended procedure for health care providers to prevent and control Hospital acquired hand infection. The hand hygiene compliance is one measure to assess the effectiveness of infection control and prevention. This study aimed to assess the hand hygiene compliance, reasons of poor compliance and proposed strategies to improve compliance, in surgical ward at CHUK.

Methods

A cross sectional, descriptive observational study was conducted in surgical wards at KUTH with observations of practice of hand hygiene by health care providers while caring for patients during the 2 months study period with interview and questionnaire completion to assess reasons of poor compliance and strategies to improve it.

Results

A total of 297 observations were done in which 489 hand hygiene moments were assessed. The overall hand hygiene compliance found is 42.94% with more compliance in the moments after body fluids exposure (66.23%) and after touching patient (61.53%). The majority of health care providers agreed that the overcrowding, understaffing, high workload, insufficient hand hygiene resources especially alcohol based hand sanitizers, inconsistently located water sinks, self-protection believes and insufficient training on infection control and prevention are the main causes of poor HH compliance. The findings revealed that the majority of health care providers agreed with six over seven proposed strategies to improve compliance which are making available alcohol based hand sanitizer, avoiding overcrowding workload and understaffing, putting reminders in workplace, having the ownership of hand hygiene behavior, training of health care providers about hand hygiene and WHO 5 moments of hand hygiene, and getting routine audit observation and feedback.

Conclusion and recommendations

In the present study the overall compliance was found 42.94%. After assessing the reasons of poor compliance, to avoid the overcrowding, workload and understaffing, regular audits and feedback, making available hand hygiene resources and education of health care providers on infection control and prevention were among the suggested strategies to improve hand hygiene compliance. The findings from herein study will form a baseline for establishing policies by health care institutions and government. They will further provide informational bases for future researchers.

Key words: WHO 5 moments of hand hygiene, hand hygiene compliance, water and soap, alcohol based hand rubs.

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ABBREVIATIONS

HAI: hospital acquired infections

WHO: world Health Organization

CHUK: Centre Hospitalière Universitaire de Kigali

HCAIs: health care associated infections

ABHRs: alcohol based hand rubs

MRSA: methicilin resistant staphilococcus aureus

LMICs: low and middle income countries

HH: hand hygiene

DEDICATION

Ton my lovely children: CYUSA Henry Bruce

NTWARI KAZE Landry

To my lovely wife: MUKASHYAKA Philomene

To my parents: BARISERURA Celestin and NAKABONYE Sylverie

To my sisters and brothers

To my friend Doctors and Nurses.

I dictate this work.

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Finally I extremely thank to my family, my parents for their love, prayers, caring and sacrifices throughout my training.

Dr. Donatien HITAYEZU

CHAPTER I: INTRODUCTION

1. Background:

The nosocomial infection is a big global health problem, especially in low income countries (LMICs) averaging approximately 25% of all admitted patient (1). This can affect the outcomes of inpatient care and result in an increased morbidity and mortality, cost and hospital length of stay as it is associated with additional antimicrobial care and hospital stay (1). Since many years ago, hand hygiene is the recommended procedure for health care providers. Hand hygiene in health workers started in mid nineteenth century after the hard work of a Hungarian physician Ignaz Semmelweis in 1846 (2), since then with the increased prevalence of hospital acquired infection (HAIs), hand washing started to be considered as the most important simple and cost effective procedure to prevent health care associated infection (2,3,4). Soap and water was first considered as hand hygiene practice until 1990 with establishment of alcohol based hand rubs (3).

Since 2005 World Health Organization (WHO) started to elaborate guidelines for improving patient safety from hospital acquired infections where they launched “Clean Care is Safe Care Challenge”. Since then many studies were conducted to improve the quality of hand hygiene during health care delivery (5). The 2005 guidelines recommended 8 distinct moments from which 3 points were removed aiming to improve compliance to the hand washing moments (5). The 5 moments of hand hygiene, was launched globally in 2009 as new guideline of hand washing in health care workers (5). The 5 moments of hand hygiene suggested by WHO during caring for patients are as follow; the moment before touching a patient, before performing a clean/ aseptic procedure, after body fluids exposure/ risk, after touching a patient, and after touching patient surroundings (1,6). Many modalities of hand hygiene including alcohol based disinfectant or hand washing with water and soap. However alcohol based disinfectants may leave some residual comparing to water and soap (7).

Many studies have revealed that the hospital acquired infections is increased in low and middle income countries are associated with low compliance to the hands hygiene strategy (8). The overall compliance is still low even in developed countries ranging between 33 to 65% in Europe (for examples 37 % in turkey, 42.39 % in Switzerland), whereas 39% is reported in India (9, 10). Several studies showed increased compliance on the moments of; “after touching the patient” or “contact with the patient environment” which in turn suggest the tendency of health workers to protect themselves rather than protecting their patients (11, 12). However, a literature search showed that global hand hygiene among health care providers is not acceptable below 40% (13, 14, 15). Among the causes of poor hand hygiene compliance there are lack of awareness to WHO 5 moments of hand hygiene, shortage of hand sanitizers, hand sinks and towels, skin reaction to hand sanitizers, work overload and the old habit of not washing hands or personal opinion (16,17). A study carried out in a regional referral hospital in Ugandan has demonstrated a decreased hands hygiene compliance due to an inadequate hand hygiene resources (18), while an interventional study done in Rwanda reported that the hand hygiene compliance was improved from 34.1 to 68.9% after making reminders in care point, making available alcohol based hand rubs (ABHRs) and education (19). A number of studies shown differences in compliances among nurses, doctors and even students, though compliance is higher in nurses than doctors (1).

The present study was carried out in Kigali University Teaching Hospital which is one of tertiary hospitals in Rwanda. CHUK supplies health services to many Rwandans from around the country, therefore increased workload as it in the low income countries in general. Thus, the hospital acquired infection is still a problem at CHUK (20). Pittet D. in 1999 showed that the interventions aiming to improve hand washing practice compliance may be effective if focused on selected ward (10). The present study was focused on assessing the practice and compliance with the WHO 5 moments of hands hygiene in the surgical wards in Kigali teaching hospital which are characterized by increased workload for specialist, nurses, and other healthcare providers. This increased workload may lead to an increased risk of transmitting nosocomial infections (7). Many interventions targeting the improvement of the overall compliance of hand hygiene would result in a positive attitude towards control of hospital acquired infections and in turn could help in curbing the risk of outbreak of infectious diseases worldwide.

2. Problem statement

Since long ago, the health care associated infections (HCAIs) remains a main public health problem with high prevalence in LMICs varying between 5.7 to 19.2% compared to 7.5% in high income countries (21). Hand hygiene according to WHO 5 moments of hand washing, is the simple, cost effective method of infection prevention and control during health care but it was reported with low compliance even in high income countries varying from 5 to 89, with overall mean 38.5% (22). The compliance remains unknown in many countries particularly in Rwanda, up-to-date.

The present study identified the WHO 5 moments of hand hygiene compliance in surgical wards at CHUK, and disseminates the results with tangible reasons to encourage the compliance of all 5 moments as a zero HCAIs campaign.

3. Aim and Objectives:

Aim

To determine the practice and compliance of WHO 5 moments of hands hygiene in surgical wards at tertiary hospital

Specific objectives

1. To assess the overall compliance of WHO 5 moments of hand hygiene in surgical wards at CHUK.
2. To assess the availability of hand hygiene resources and how they affect compliance.
3. To identify reasons of poor compliance and strategies to improve it.

CHAPTER II. LITERATURE REVIEW

2.1. Introduction

Since many years, hand hygiene has been considered as simplest and most effective methods of infection control and prevention as about 50% of HCAIs is associated with poor hand hygiene of health care providers (23). HCAIs remain a global health burden especially in developing countries. In this section we discussed about hand hygiene practice with available resources, the importance of developing hand hygiene to reduce the burden of health care related infections

(HCAIs), WHO 5 moments of hand hygiene and its compliance and we will discuss about the constraints of poor compliance and tackling strategies.

2.2. Evolution of Hand hygiene practice with available resources

Washing hands with water was a tradition related to cultures and religions where it was being considered as a ceremonial way to get spiritual purity (8, 24). It took many years to arrive in 1546 when was the first time considered as a scientific way of controlling the spread of infection from either clothes to hands or person to person (25). The Hungarian obstetrician Ignaz Semmelweis in 1856 in Vienna was the first to prove that infectious microbes may be transmitted from person to person by hands (2). Since then hands washing was found to be the single most effective practice to prevent and control hospital acquired infections which are considered as reservoir of multidrug resistance (25). It commenced using water only but found that water was not enough to kill germs so the need of additional chemical product to eliminate those infectious microbes from hands so the need of soap (24). The year 1990s was found as the principal period of initiating the usage of alcohol based hand rubs (ABHRs) as a multimodal strategy of hand hygiene as it is associated with increased hand hygiene compliance and reduction of HCAIs and *methicillin resistant staphylococcus aureus* (MRSA) colonization compared to the traditional use of soap and water (26). However, soap and water are still considered as alternative way and encouraged to be used in special conditions especially in highly soiled hands. The financial issues continue to limit the priority use of ABHRs in place of water and soap which may explain the low compliance of hand washing in LMICs (154).

2.3 The importance of developing hand hygiene

Hospital acquired infection is a major public health concern of safety for patient and health care providers and it is highly associated with institutional financial status where remarked to be higher in lower and middle income countries than in high income ones (1). It is associated with increased morbidity and mortality, hospital length of stay and patients costs especially in high risk patients like elderly, chronic lung diseases, malnourished, immune-compromised and surgical patients (25, 27). It was reported to be 7.5 % in high income countries with 5.7 to 7.1% in Europe and 4.5 in USA where it is 5.7 to 19.2% in LMICs(20). HAI was reported more

prevalent in specialized health care 7.8% tertiary health care 7.4% compared to secondary and primary health care institutions with 6.3 and 5.8% respectively (28).

Most of the time HAIs is associated with mechanical ventilation, urethral, peripheral and central venous catheterization, drains and surgical wounds where (Intensive care unit) ICU was reported high prevalence as it where there is increased use of proton pump inhibitors, antibiotics and respiratory support (29). The most common types of HAIs are pneumonia, lower respiratory infections, surgical wounds infections, urinary tract infection and sepsis (30).

Many causative agents were found to be responsible for HAIs where around 12 to 17 microorganisms were isolated (31). Among them there are *Staphylococcus aureus*, Enterococcus species, *Escherichia coli*, *Klebsiella pneumonia/oxytoca* and candida and 16 to 20% are multidrug resistance species including Meticilin resistant, Vancomycin resistant, Carbapenem resistant and *Pseudomonas aeruginosa* (31). These microorganism species are different from country to country with their resistance also are different (27).

In order not to be limited to hospital , it was extended to health care associated infections as considered with infections that patients acquired from health care environment while receiving care and may be from hospital, from community health workers, health centers, pharmacies even in ambulances (27, 32). HCAIs are considered as infections that patients acquired and presented after 48hours or more within 30 days after receiving medical care (33).

Following part of the Hippocratic Oath, it is obvious that since many years ago patients can get harm as good from their health care providers so getting infections may be more harm and even more deadly than the conditions that brought patients to the hospital (27, 33).

Since there were increased prevalence of hospital acquired infections and antibiotic resistance despite the development of antibiotics, the one way found strong and recommended is hand hygiene (27).

2.4 WHO five moments of hand hygiene, its compliance and constraints of good compliance

Many countries had adopted the hand hygiene strategy to prevent HAIs. Many complaints have been launched to empower and improve the compliance of hand washing. In 2005 WHO launched the first Global patient safety” Clean Care is Safe Care” challenge after reviewing the

effectiveness of hand hygiene in preventing HCAs which is a burden to the patient, and public health in general (34). WHO moments of hand hygiene started with 8 points but to improve compliance of hand hygiene 3 moments was removed from 8 to 5 points and WHO recommends 5 moments of hand hygiene to be (5):

1. Before touching the patient.
2. Before clean/aseptic procedure.
3. After body fluids exposure.
4. After touching patients.
5. After touching surroundings.

The hand hygiene compliance differs from country to country and in general it is still low comparing to the effectiveness of hand hygiene in reducing HCAs and antibiotic resistance where it varies from 5 to 89% with overall mean of 38.7% (35). Even though there is increased incidence of highly virulent and contagious microorganisms, but most HAIs are preventable especially with good hand hygiene compliance (26). That is the reason why WHO developed many strategy to improve HHs compliance like system change, performance of feedbacks, education and training, reminders in the workplaces and adequate financing for modernization and optimization of standard activities(15). The ABHRs improved compliance a lot with associated reduction in time spent during washing hands compared to the use of water and soap (26). Specific Compliances in moments differ from moment to moment where there is selfishness in health care with more compliance after touching patient or surroundings compared to before touching patient (18).

CHAPTER III: METHODOLOGY

Study design and sampling

The present study used a cross sectional descriptive design under a pragmatic paradigm to provide the insight on the practice and compliance of WHO 5 moments of hand washing. The primary data were collected from surgical wards at CHUK which include ward 1 and ward 2 for general surgery patients, ward 7 for orthopedic patients and burn unit ward with 82 beds in total. For the sake of efficiency in resources use, the central limit theorem was used in determining the sample size during this study. The study population includes Health Care Providers of categories

consultant, nurses, residents, medical/nursing students and others such as physiotherapist or nutritionist. The participants were selected with the aim of targeting health care providers who have been frequenting surgical wards during study period. The data collection was carried out during two months and 2 weeks period from the first January to the first April 2021 with two weeks in between sessions as the study has two sessions; the first (observation of hand hygiene practice) and the second (interview for the causes of poor compliance and strategies to improve compliance). The health care providers who helped in data collection as observer and those who were absent during data collection are excluded.

Data collection methods

Prior to data collection, a questionnaire was adapted from a standard WHO 5 moments of hand hygiene data questionnaire and used to check demographic data, health workers category, hand hygiene resources available, hand hygiene practice to provide information about the methodology by which hand hygiene were performed and lastly the WHO 5 moments Of hand hygiene. A separate questionnaire were administered to key informants to check reasons of poor hand hygiene compliance in surgical wards and proposed strategies to improve compliance.

Data quality control mechanism

The observation was performed by principal investigator with the help of 2 medical students who spent 3 days in wards before data collection after getting a training of 2 days on WHO 5 moments of hand hygiene, aim and objective of the study and familiarization with data collection tool. The direct observation was performed during the shift time, morning, day or evening spending minimum 4 hours in ward. On a daily basis, close supervision as made by the principal investigator to ensure the consistence and completeness of the collected data.

Data entry and analysis

Information was entered using Epidata software (version 3.1) and then exported to IBM SPSS for further analysis. From descriptive data analysis, the overall compliance was obtained from the frequencies, percentages and means. And the generated values were used to evaluate the demographic data, health workers category, hand hygiene resources available, hand hygiene

practice to provide information about the methodology by which hand hygiene were performed and lastly the WHO 5 moments Of hand hygiene, where SPSS software was used.

Ethical consideration

An approval of this study was gotten from University of Rwanda ethical and research committee (CMHS IRB) with approval notice No 030/CMHS IRB/2020 and the permission to do the present study at the level of the hospital was given by CHUK ethic committee (REF: EC/CHUK/0830/2020), with verbal consent from surgical ward unit manager.

CHAPTER IV: RESULTS

4.1 Demographic characteristics

In this study, among the study participants, 53.5% were nurses (figure 1), where the majority of them 64.3% were female. Most of the data 72.4% were collected during day time (table 1).

Table 1. Demographic characteristics of participants.

Variable	Categories	Frequency	Percentage
Health care category	Consultant	20	6.7
	Nurse	159	53.5
	Resident	41	13.8
	Student	65	21.9
	Others	12	4
Gender	Male	106	35.7
	Female	191	64.3
time of observation	Morning	50	16.8
	Day	215	72.4
	Evening/night	32	10.8

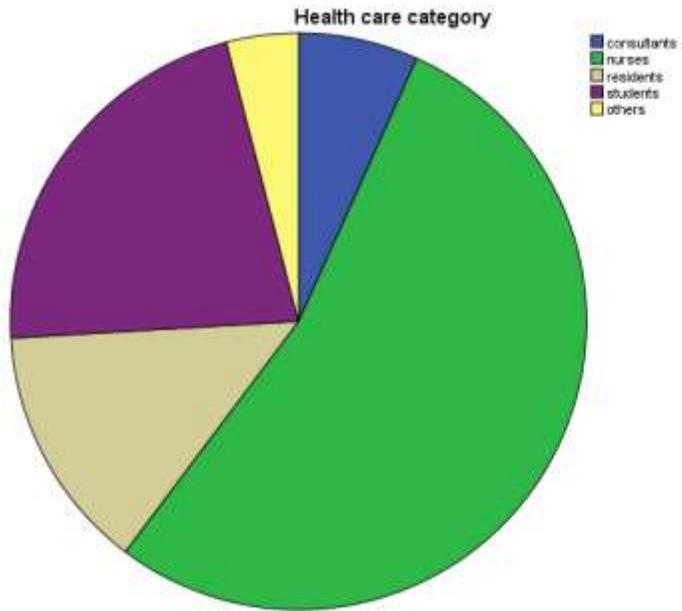


Figure 1: Health care category observed.

4.2 Overall compliance of WHO 5 moments of hand hygiene in surgical wards at CHUK

In a total of 297 observations were done, in which 489 hand hygiene opportunities assessed as on every observation, one or more hand hygiene moment among 5 WHO moments of hand hygiene may be observed. The overall compliance of hand hygiene in surgical wards at CHUK was **42.94%** (table 2), with specific compliance moments by moment shown in figure 2. The moments received a high compliance 66.23% was “after body fluid exposure” followed by “After touching patient” with 61.63% while the least found compliance related to the moments “Before touching a patient” with 12.28% followed by “Before clean/aseptic procedure” with 19.4%.

Table 2: The overall compliance in percentages

WHO hand hygiene moment	Hand hygiene performed (N)	Hand hygiene not performed (N)	Total opportunity (N)	Hand hygiene compliance (%)
Before touching a patient	14	100	114	12.28
Before clean/aseptic procedure	13	54	67	19.4
After body fluid exposure	51	26	77	66.23

After touching patient	106	66	172	61.63
After touching patient surroundings	26	33	59	44.07
Overall hand hygiene	210	279	489	42.94

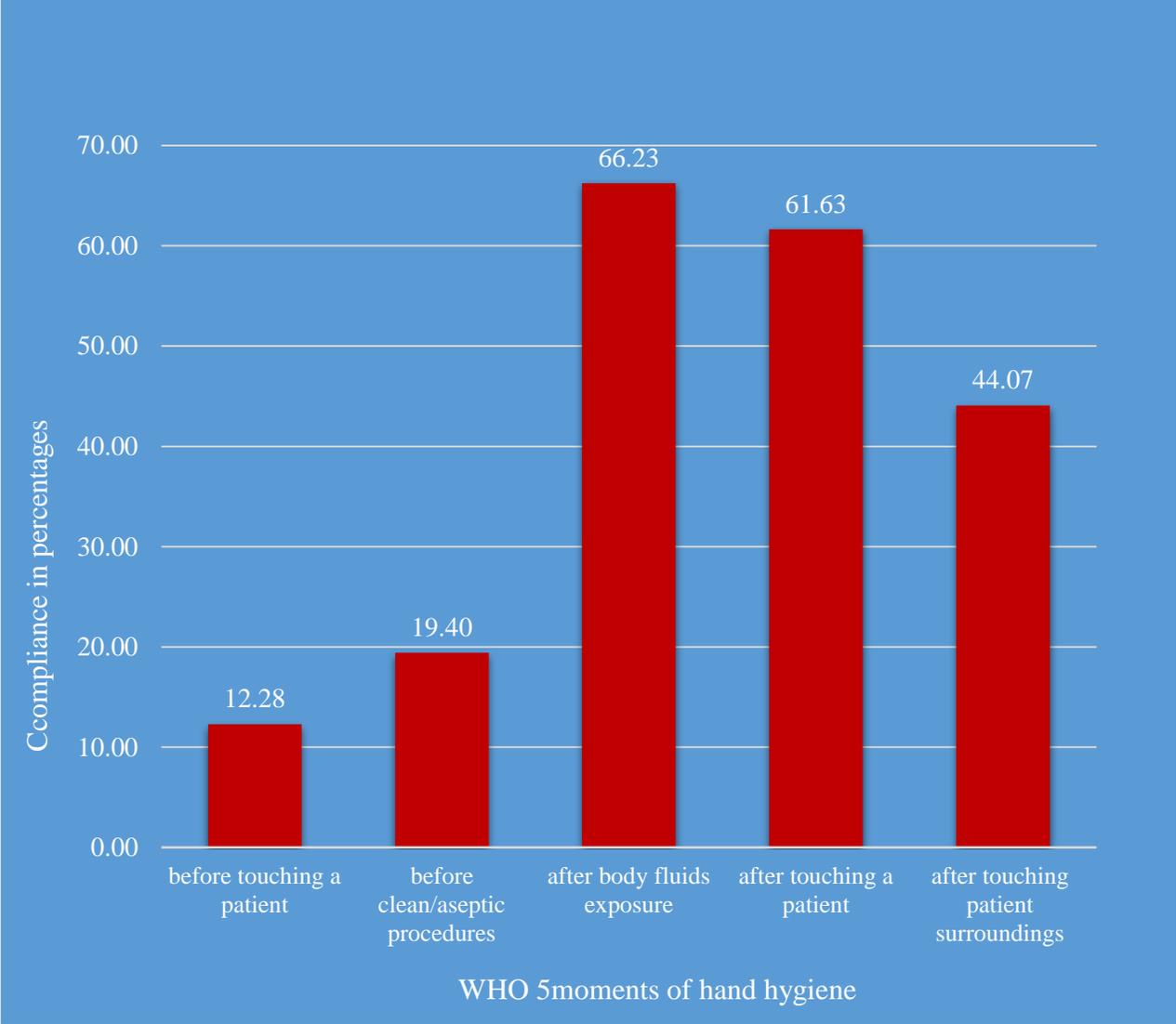


Figure 2: Hand hygiene compliance in surgical wards at CHUK by WHO 5 moments of hand hygiene.

4.3 The effect of availability of hand hygiene resources on compliance

The CHUK surgical wards ;Ward 1, Ward 2, Ward 7 and burn unit ward, were surveyed for availability of hand hygiene resources and practice. There were in total 82 beds with only 8

water sinks and soap, and with alcohol based hand sanitizer placed in nursing station and trolleys. For every observed opportunity, water and soap were available at 80.81% extent and alcohol-based hand sanitizer available at 70.71% in all work shift; morning, day and evening (figure 3). The overall compliance of WHO 5 moments due to availability of resources revealed that 57.80% of participants comply to water against 55.92% with alcohol (table 3).

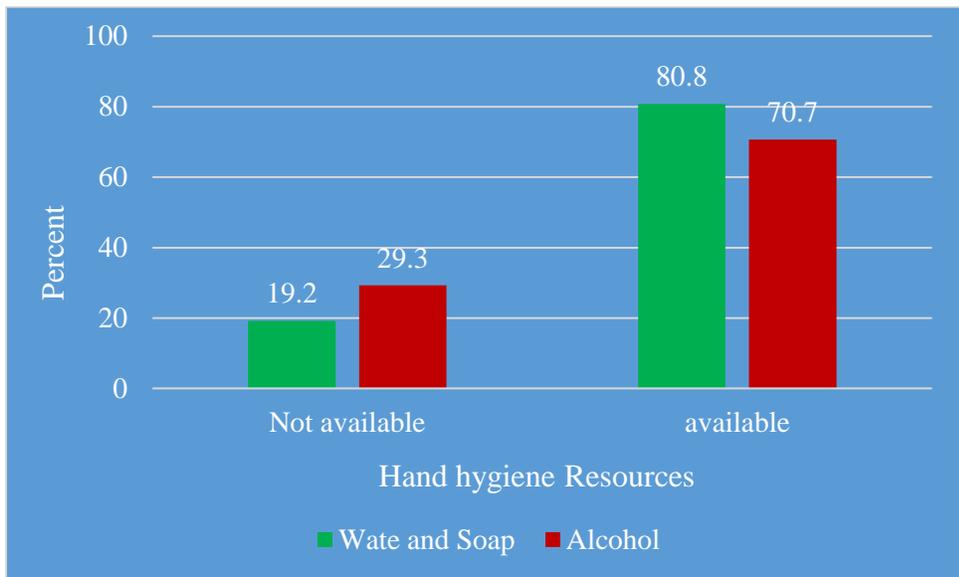


Figure 3. Availability of hand hygiene resources

Table 3: compliance by hand hygiene resources available

Resource	Before touching patient (%)	Before clean/aseptic procedures (%)	After body fluids exposure (%)	After touching patient (%)	After touching patients surroundings (%)	Overall compliance (%)
Washed with water and soap	9.52	42.86	75	81.4	45.45	57.8
Hand rubs with alcohol based hand sanitizer	17.74	24.32	81.03	76.92	53.49	55.92

4.4 Causes of poor compliance and tackling strategies

The present study further assessed the causes of low compliance and proposed strategies to improve hand hygiene compliance. The Likert scale questions were used as it is simple and practical way to measure the strength of the opinions of participants. To interpret the results the

mean scores were compared to the calculated weighted averages Likert scale as formulated by Alonazi M. and his collaborators (table 4) (36).

Table 4: Weighted averages values for Likert scales (5 points)

Weighted average	Result
1-1.79	Strongly disagree
1.80-2.59	Disagree
2.60-3.39	Neutral
3.40-4.19	Agree
4.20-5	Strongly agree

For the likely causes of poor hand hygiene compliances, the table 5 summarized the results with interpretation of results.

Table 5: Causes of poor hand hygiene compliance

Causes of poor HH compliance	mean	Std. Deviation
wearing gloves	4.02	4.02
Forgetfulness	3.75	1
Ignorance	3.04	1.091
not important on every patient	1.81	0.734
Self-protection	3.73	0.844
Insufficient time	4.27	0.765

high workload and under staffing	4.58	0.577
inconsistently located water sinks	4.46	0.617
insufficient alcohol based hand sanitizer	4.54	0.743
low risk of acquiring infection from patients	2.17	0.883
insufficient training on infection control and prevention	3.63	0.937
loss of awareness of WHO 5 moments of hand hygiene	2.52	1.01

From table 5, the constraints of hand hygiene compliance were assessed in health care providers in surgical wards. The majority strongly agreed that the causes of poor compliance include: high workload and understaffing, insufficient alcohol-based hand sanitizer, inconsistently located water sinks, insufficient time to practice hand hygiene especially in case of emergencies. We used these data to make graphical illustration of the revealed causes by means of responded likert scale in figure 4.

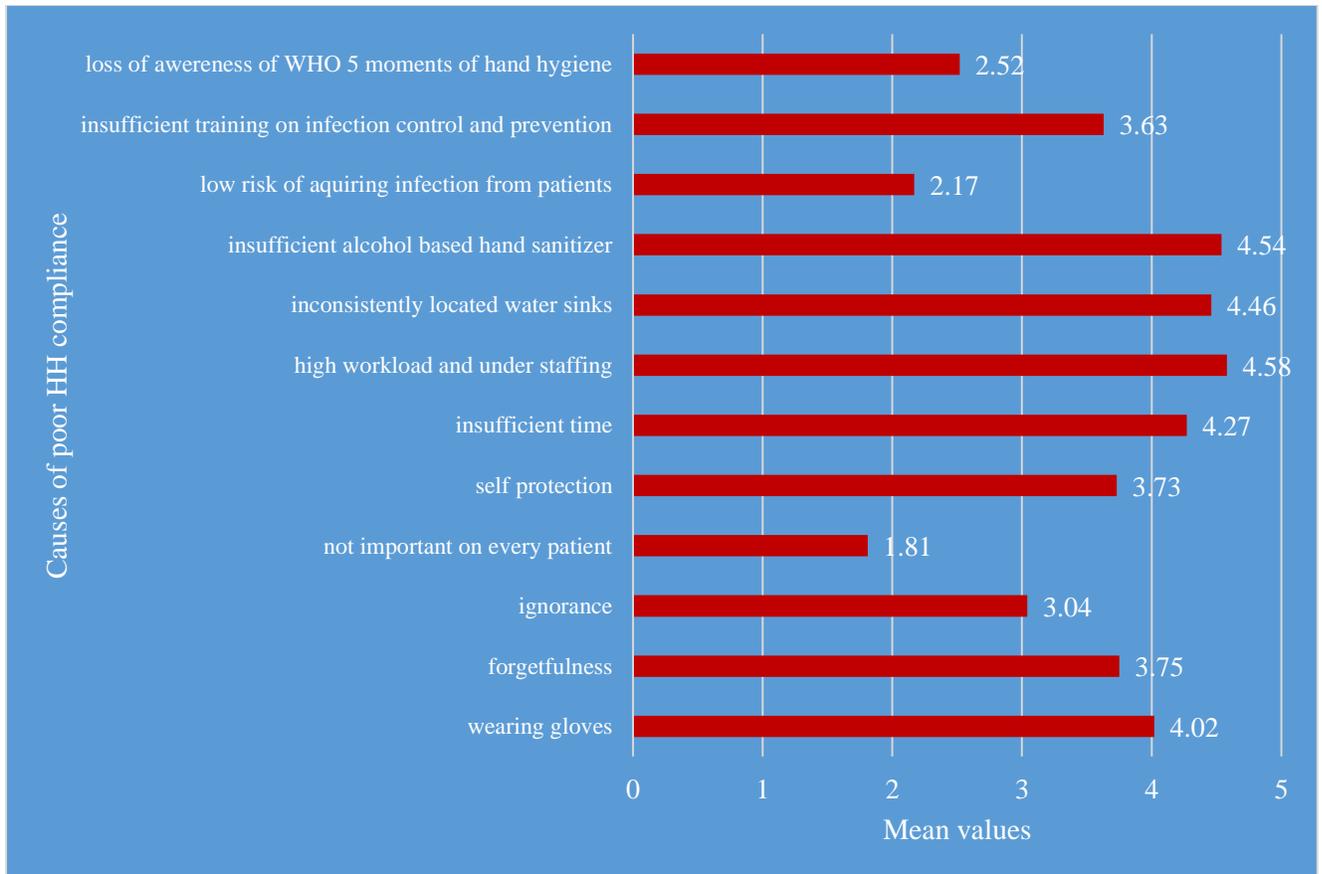


Figure 4. Causes of poor hand hygiene compliance

The findings from this study proposed seven strategies that might be used to improve HH compliance. The results revealed that the respondents agreed with six out of seven strategies.

Table 6. Strategies to improve hand hygiene compliance

Strategies to improve HH Compliance	Mean	std. deviation
Make available alcohol based hand sanitizer	4.46	.617
Avoid overcrowding, workload and understaffing	4.25	.601
Routine observation and feedback	3.54	.922
Administrative sanctions and feedback	1.96	.944
Reminders in workplace	4.10	.778
Training of health care providers about WHO 5 moments of hand hygiene	4.04	.683
Ownership of hand hygiene behaviour	4.08	.577

From table 6. The strategies to improve HH compliances were proposed where the majority of interviewed health care providers strongly agreed that to make available alcohol-based hand sanitizer, avoiding overcrowding workload and understaffing, and agree to put reminders in the

workplace, having the ownership of hand hygiene behaviour, training of health care providers, and routine audit observation of compliance and feedback. But they were not conclusive about having administrative sanctions and feedback. We used these data to make graphical illustration of the revealed strategies by means of responded Likert scale in figure 5.

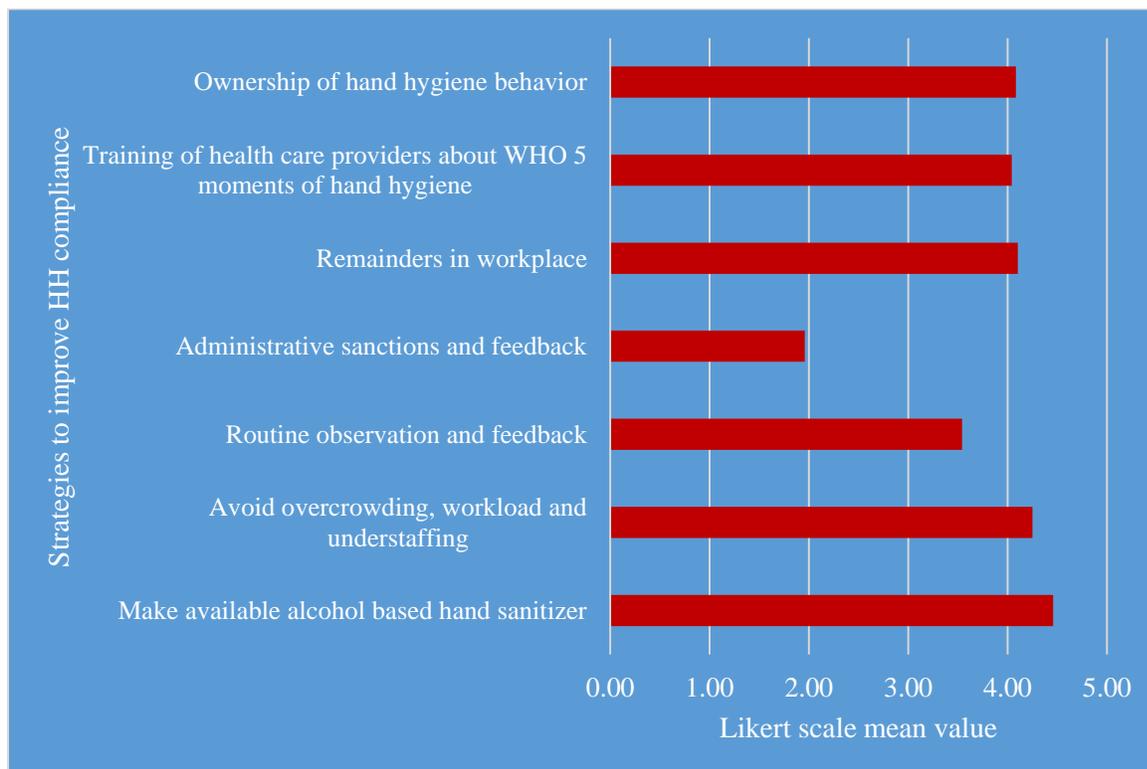


Figure 5. Strategies to improve hand hygiene compliance

CHAPTER V: DISCUSSION

5.1 Overall compliance of WHO 5 moments of hand hygiene in surgical wards at CHUK

This observational study showed **an** overall hand hygiene compliance of 42.94%. **The findings from this index study is comparable to those conducted in India; 43.2% (37) and Switzerland 42.39% (38).** The results of this index study are an improvement of a previously reported one during the baseline study in rural hospital in Rwanda, 34.1% (18). The finding from this present study is comparatively better than the ones reported from some other low and middle income countries like in Ethiopia, 16.5% and Mali, 21.8% (39). It is also consistent with study that have shown that the hand hygiene compliance is rarely more than 50% even in developed countries (40). The hand hygiene compliance explains the effectiveness of the fight against the

HCAIs where to improve the overall compliance is significantly associated with reduction in HCAIs incidences (41). The differences in HH compliance add occurred among countries may be attributed to the availability of hand hygiene resources, trainings, effectiveness of infection control and prevention committees, differences in study settings, sample size and limitations.

The results from this study further showed the considerations among indications of hand hygiene during the observations, and shown that the moments of “after body fluid exposure” and “after touching patient” gained compliance of 66.23% and 61.53%, respectively, which have higher compliance compared to moments of “before touching patient”, “before clean/aseptic procedure” and “after touching patient surrounding” with compliance of 12.28%, 19.4% and 44.07% respectively. This is comparable with other studies that have shown differences in compliances depending on 5 moments of hand hygiene with higher compliance in moments “after body fluid exposure” and after touching patient” compared to lower compliances in moments of “ before patient contact”, before clean /aseptic procedure” or “after contact with patient surroundings”(18,42). This difference may be due to the belief and fear of health care providers to contract nosocomial infections from patients rather than tending to prevent and protect the patient from acquiring HAIs (18).

5.2 The effect of availability of hand hygiene resources on compliance

The compliance variations with hand hygiene resources available were assessed herein study. Alcohol based hand sanitizer were available in 70.1% of all observations. Water and soap were available at 80.8% with the overall compliance of 57.8% when washed with water and 55.92% when alcohol based hand sanitizer were used. These findings are not far from the data reported in previous studies where the unavailability of ABHRs during the present study affected much the hand hygiene compliance as a result ABHRs gained a lower compliance compared to water based compliance. However one study has shown that compliance improves with introduction of alcohol based hand hygiene paralleled to water and soap (43). The presence of hand sanitizer at the point of care may play a role as a reminder for hand hygiene which was encouraged by WHO as the preferred method of hand hygiene. And It has been shown that the broad antimicrobial spectrum, highly effective, easily available and well tolerated by the skin (44). The availability of hand hygiene resources was found to be associated with improved hand hygiene compliance,

and may explain the poorer HH compliances in LMICs countries compared to high income countries (39, 45).

5.3. Causes of poor compliance and tackling strategies

The constraints of hand hygiene compliance were assessed in health care providers of all categories in surgical ward during the present study through key informants' interview. The findings revealed that the participants agreed with the following causes of poor compliance, high workload and understaffing, insufficient alcohol based hand sanitizer, inconsistently located water sinks, insufficient time to practice of hand hygiene especially in case of emergencies. The results also showed that forgetfulness, wearing gloves, self-protection believes, insufficient training on infection prevention and control are obstacles for good hand hygiene compliance. These results are in line with previous studies and guidelines to improve hand hygiene compliance confirmed that especially lack of hand hygiene resources, or poorly located, are considered as the main reason of poor compliance (46, 47).

Considering the strategies to ameliorate hand hygiene compliance, the majority of interviewed health care providers strongly agreed that making alcohol based hand sanitizer available, avoiding overcrowding, workload and understaffing would improve HH compliance. The results further showed that the key informant agreed with putting reminder notices in workplace, having the ownership of hand hygiene behavior, training of health care providers, and getting routine audit observation and feedback would also enhance HH compliance. However, they were not conclusive about having administrative sanctions and feedback. These results are in accordance with findings from study carried out in Ethiopia in 2019 and Switzerland in 2017 (38, 45), which showed that improving hand hygiene compliance needs a multidimensional approach. But making available alcohol based hand sanitizer on each side of point of care, having regular audits and feedback and multidisciplinary infection prevention and control educations were recommended (48).

Limitations of the study

1. Due to the instructions and restrictions to curb the spread of Covid-19, the frequentations in wards were limited. Which in turn reduced the expected of health care provider.

2. The study was conducted during the Covid-19 pandemic period, where everyone were encouraged to routinely wash hands with water and soap or alcohol based sanitizer in order to prevent and control Covid-19. Thus, this might have led to bias and Hawthorne effect during data collection.
3. The poor cooperation by health care providers as they were not informed about the objectives of the study to prevent the Hawthorne effect.

CHAPTER VI: CONCLUSION

The compliance of WHO 5 moments of hand hygiene among health care providers continues to be low especially in developing countries. In this study the overall compliance was 42.94% with higher compliance in the moments of “after body fluid exposure, 66.23%” and “after touching patients, 61.63%” while the lowest compliance was related to “Before touching a patient, 12.28%”. The reasons of low compliance were found to be likely due to; high workload, overcrowding and understaffing with lack, and insufficient or poor located hand hygiene resources. The majority of health care providers in CHUK surgical wards suggested that; avoiding workload and understaffing, making available hand hygiene resources in all point of care areas, regular audits and feedback with education of health care provider about infection control and prevention especially WHO 5 moments of hand hygiene, may improve the hand hygiene compliance so far reduce the prevalence of health care associated infections. The findings from herein study will form a baseline for establishing policies by health care institutions and government. They will further provide informational bases for future researchers.

RECOMMNDATIONS:

1. There is a need to do similar study in other departments to have an overall image of compliance with WHO hand hygiene in CHUK.
2. Further studies are recommended to assess the optimal duration and efficiency of hand washing and impact of improved compliance to the reduction of nosocomial infections
3. The hand hygiene is simple and cost effective but the compliance is still very low. It is therefore recommended that regular training, reminders, audits and sanctions will improve compliance

4. The institution might fight to improve infrastructures to avoid overcrowding, and proper hand hygiene availability and disposition, for the safety of the patients.

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ANNEXE I: INFORMED CONSENT

AMAKURU KU MASEZERANO MU KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

Ubushakashatsi “on **Practice and compliance with the WHO 5 moments of hands hygiene in surgical wards at CHUK, a Rwanda tertiary Hospital**” ni ubushakashatsi bwiga ku gikorwa cyo gusukura intoki hakurikijwe ibihe bitanu ishami ry’ umuryango w’ abibumbye (WHO) ryashyiriye abakora mu buvuzi bisukura igihe bari mu barwayi, bukorerwa mubitaro bya kaminuza bya Kigali (CHUK) mu nzu y’ imbarwa.

Umwirondoro w umushakashatsi: Dr HITAYEZU Donatien, umuganga wiga mu ishami ryo gutera ikinya muri kaminuza y’ u Rwanda.

Intego: Ubu bushakashatsi bugamije kwiga ku muco wo kugira isuku igihe turi mu barwayi, tugenze niba uburyo bwo kwisukura buhari, niba abakora abakora ku barwayi bamenyereye kwisukura hakurikije ibihe 5 byo gusukura intoki, kwiga ku bintu by’ ingenzi byakorwa kugirango umuco wo koga intoki mu ngeri zose z’ abakora mu buvuzi watera imbere.

Ingaruka: nta ngaruka zihari ku muntu wemeye kugira uruhare muri ubu bushakashatsi

Inyungu: ibizava muri ubu bushakashatsi bizafasha mu kubungabunga ubuzima bw’ abarwayi hirirwa kurushaho indwara zandurirwa mu bitaro, nta nyungu y’ amafaranga irimo

Ibanga; amakuru yose kuri buri muntu azajya abikwa n’umushakashatsi kugirango akoreshwe mu bushakashatsi gusa.

Ugize ikibazo: mu gihe umuntu ari muri ubu bushakashatsi agize ikibazo wakiymbaza

Dr HITAYEZU Donatien, tel: 0784461203, e. mail: donhitayep@yahoo.fr cyangwa

Dr Jean Paul MVUKIYEHE 07830888440 umugenzuzi w'ubu bushakashatsi.

Uburenganzira bwo kwivana muri ubu bushakashatsi:

Ushobora guhagarika uruhare rwawe muri ubu bushakashatsi igihe icyo aricyo cyose kandi ntubiryoze.

AMASEZERANO YO KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

Njyewe,..... maze gusoma ibyanditswe hejuru kandi nabisobanukiwe. Nasobanuriwe birambuye mu rurimi numva intego, inyungu n'ingaruka muri ubu bushakashatsi. Nasobanuriwe n' uko nemerewe kwivana mu bushakashatsi igihe mbishakiye ntangaruka ngize.

Nshyize umukono kuri aya masezerano nsobanukiwe kandi nemerako nzagira uruhare muri ubu bushakashatsi.

Umukono wanjye..... tariki:.....

Njyewe Dr HITAYEZU Donatien nasobanuriyebirambuye intego inyungu n'ingaruka by'ubushakashatsi.

Umushakshatsi.....tariki:.....

INFORMED CONSENT FORM

My name is Dr HITAYEZU Donatien, I am conducting a research on “**Practice and compliance with the WHO 5 moments of hands hygiene in surgical wards at CHUK, a RWANDA tertiary hospital**” with the **aim** to determine the practice and compliance of WHO 5 moments of hands hygiene in surgical general wards at tertiary hospital and **objectives** to assess the availability of hand hygiene resources, to assess how different category of health workers are compliant with hand hygiene, to identify key elements needed to improve hand hygiene in wards in wards.

You will be selected voluntarily participate in the study by giving me permission to interview you and to complete an anonymous questionnaire on the topic of hand hygiene practice.

Your name will remain confidential throughout the study. You can withdraw from the study at any stage. The information which you provide will remain anonymous at all stage of the study. You will not receive any form of remuneration for participating in the study.

The information based on the study will assist health authorities to establish policies, guidelines in infection control.

If you have read the above information and you agree to participate in the study, please complete the following section.

I _____ understand the purpose and value of the study. I further understand my rights and my responsibility to provide honest response to the questions in the questionnaire. I take note of the facts that I will not receive any remuneration and that as an individual will remain anonymous and the information, I provide is confidential. I agree that I participate in this study voluntarily

Signature_____

Date_____

Researcher:

I ,..... have explained the purpose of this study to the participant to the best of my knowledge and he/she has fully understood the purpose, benefits and risks to him/her.

Signature:.....date:.....

- **Contact address of the researcher:** Dr HITAYEZU Donatien;Tel:0784461203 donhitayep@yahoo.fr
- **Contact details of the research supervisor (for further information on the Research and reporting of study related adverse events).** Dr Jean Paul MVUKIYEHE 07830888440
- CHUK ethic committee contact: +250788213765

- 2) Hand washing with soap and water: yes no
- 3) Using alcohol or other hand sanitizers: yes no
- 4) No action taken: yes no
- 5) Gloves: On: yes no
- Off yes no
- Continue with: yes no

D. WHO hand hygiene moments:

- a) before touching a patient: yes no
- b) after touching a patient: yes no
- c) before aseptic and clean procedures: yes no
- d) after being at risk of exposure to body fluids: yes no
- e) after touching patient surroundings: yes no

PART B: INTERVIEW

Practice and compliance with WHO 5 Moments of hand hygiene in surgical ward at CHUK

Date:...../...../.....

Health care category:.....

1. Reasons of noncompliance of WHO hand hygiene in surgical ward at CHUK

	<u>Strongly disagree</u>	<u>Disagree</u>	<u>neutral</u>	<u>Agree</u>	<u>Strongly agree</u>
i. Wearing gloves					
ii Forgetfulness					
iii Ignorance					
iv. Not important on every patient					
v. Self-protection					

vi.	Insufficient time					
vii.	High workload and understaffing					
viii.	Inconsistently located/ insufficient water sinks					
ix.	Insufficient alcohol based hand sanitizer					
x.	Low risk of acquiring infection from patients					
xi.	Insufficient training on infection control and prevention					
xii.	Loss of awareness of WHO 5 moments hand hygiene					

2. Strategies to improve hand hygiene compliance in surgical ward at CHUK

	<u>Strongly disagree</u>	<u>Disagree</u>	<u>neutral</u>	<u>Agree</u>	<u>Strongly agree</u>
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Make available alcohol based hand sanitizer					
Avoid overcrowding, workload and understaffing					
Routine observation and feedback					
Administrative sanctions and feedback					
Reminders in workplace					
Training of health care about WHO 5 moments of hand hygiene					
Ownership of hand hygiene behavior					

ANNEXE III: ETHICAL APPROVALS



UNIVERSITY of
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 18th/February/2020

Dr HITAYEZU Donatien
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 030/CMHS IRB/2020

Your Project Title "*Practice and Compliance with the WHO 5 Moments Of Hands Hygiene In Surgical Wards At CHUK, A RWANDA Tertiary Hospital*" has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS		X	
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josec	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 17th February 2020, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,



Professor GAHUTU Jean Bosco
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Date of Approval: The 18th February 2020

Expiration date: The 18th February 2021

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR



Review Approval Notice

Dear Donatien HITAYEZU,

Your research project: "on Practice and compliance with the WHO 5 moments of hands hygiene in surgical wards at CHUK, a RWANDA tertiary hospital "

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 01, Oct, 2020 to evaluate your request for ethical approval of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your research project.

You are required to present the results of your study to CHUK Ethics Committee before publication by using this link www.chuk.rw/research/fullreport/?appid=112&&chuk.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

Dr Emmanuel Rusingiza Kamanzi
The Chairperson, Ethics Committee,
University Teaching Hospital of Kigali



Scan code to verify

" University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations "