Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities, Rwanda.

By

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KEYWORDS

Attitudes

Beliefs

Hand hygiene

Hand-washing compliance

Healthcare associated infections

Intentions

Midwife

Nurse

Newborn

Prevention
ABSTRACT
Infections (including healthcare-associated infections) are one of the leading causes of neonatal morbidity and mortality, yet these deaths could be prevented by cost-effective interventions. Handwashing (HW) is crucial to preventing the spread of antimicrobial resistance and reducing healthcare-associated infections (HCAIs). However, healthcare workers’ compliance with optimal practices remains low in most settings. The purpose of this study was to determine the compliance with HW among nurses and midwives caring for newborn babies at Rwamagana Health Facilities, and the extent to which demographic and cognitive characteristics predict nurses’ HW compliance. The study’s methodology involved a cross-sectional approach encompassing descriptive and quantitative methods. The data was collected over a period of 3 weeks from a total sample of 139 nurse-midwives. An anonymous self-administered questionnaire was used to collect data; out of 139 questionnaires distributed 134 were returned back completed, giving a rate of 96.4%. The data analysis was done using SPSS software version 21. The results demonstrate that a mean self-reported HW compliance rate was 82.00% (SD=13.60). A compliance rate of 80% or greater was confirmed by most of the participants in the study (79.1%). The highest reported rate of hand washing was HW after exposure to the newborn’s body fluids (M= 89.33%; SD= 14.878), while results revealed that nurses tend to perform less HW after touching an object in the vicinity of the patient (73.43%; SD=22.81). A multiple regression analysis revealed that attitudes, subjective norms and intentions were unique independent predictors of HW compliance. However, results did not show any relationship between HW and nurses’ demographic characteristics. This study recommends that, strategies aiming to improve HW compliance must be focused on concepts that predictHW. Further research ought to be conducted using observational approach.
DECLARATION

I declare that *Hand-washing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities in Rwanda*, is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Uwimana Philomene  August 2014

Signed: ................................
DEDICATION

I dedicate this academic piece to Almighty GOD for all the blessing bestowed upon me thus far.

To my husband Mpenzi Rujari Thierry and our children Luc, Chelsea, Lyse, Loïc and Kelssy for their love, patience and support.

And to my beloved mother, and siblings for the relentless prayers and motivation.
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<tr>
<td>CDC</td>
<td>Center for Disease Control</td>
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<tr>
<td>CINALHL</td>
<td>Cumulative Index to Nursing and Health Literature</td>
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<td>CI</td>
<td>Coefficient interval</td>
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<td>Dr</td>
<td>Doctor</td>
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<td>HCAIs</td>
<td>Health care- associated infections</td>
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<td>HCPs</td>
<td>Healthcare Professionals</td>
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<td>HCWs</td>
<td>Healthcare workers</td>
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<td>HH</td>
<td>Hand Hygiene</td>
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<td>HW</td>
<td>Hand Washing</td>
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<td>IRB</td>
<td>Institutional Review Board</td>
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<td>M</td>
<td>Mean</td>
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<td>MD</td>
<td>Median</td>
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<td>NICU</td>
<td>Neonatal Intensive Care</td>
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<td>NISR</td>
<td>National Institute of Statistics of Rwanda</td>
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<td>RMoH</td>
<td>Rwanda Ministry of Health</td>
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<tr>
<td>SD</td>
<td>Standard deviation</td>
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<tr>
<td>SPSS</td>
<td>Statistical package for social sciences</td>
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<td>TPB</td>
<td>Theory of Planned Behavior</td>
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<td>TRA</td>
<td>Theory of Reasoned Action</td>
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<tr>
<td>UWC</td>
<td>University of the Western Cape</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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CHAPTER ONE:

GENERAL INTRODUCTION

1.1 Introduction and Background

This chapter provides the background of the study; consisting of insights into hand washing practice as one of the key strategies for preventing healthcare-associated infections (HCAIs) among newborns. The World Health Organization (WHO) reports that newborns die from preventable causes; and infections are regarded as the major cause of newborn mortality as they account for more than one third of neonates’ deaths (Ayaz and Saleem, 2010:1). These data indicate that there is a need for provision of low-cost interventions such as hand washing which could reduce this burden among vulnerable populations. Furthermore, the chapter highlights the role of nurses in preventing HCAIs among newborns, as well as their poor hand washing compliance. The problem statement, aim, objectives, research questions and significance of the study as well as definition of terms are outlined in this chapter.

In 2000, 189 member countries of United Nations (UN) set the millennium development goals (MDGs) - consisting of 8 important goals- to be achieved by 2015 towards the development and well-being of their nations. Among these goals, the fourth goal is to reduce by two-third the mortality of children under five years old between 1990 and 2015. In developing regions it means that the mortality rate of children under-five years should have dropped from 97 deaths per 1,000 live births in 1990 to less than 32 deaths/ 1000 live births (UN, 2012:26) including those occurring in the neonatal period. UN reported that progress is being made to reduce under-five mortality; the numbers of under-five deaths have dropped from more than 12 million deaths
in 1990 worldwide to 7.6 million in 2010. The developing regions have seen the under-five mortality rate falling from 97 deaths per 1.000 live births in 1990 to 63 deaths per 1.000 live births in 2010 (UN, 2012:26). However, the reduction of deaths of infants in their first month of live does not follow this trend of progress. In the same report, it is said that nearly all regions have seen slower declines in neonates deaths than in under-five mortality during the last two decades. The neonatal mortality rate fell from 32 deaths per 1.000 live births in 1990 to 23 deaths per 1.000 live births in 2010 worldwide (UN, 2012:27).

According to Black, Cousens, Johnson, Lawn, Rudan, Bassani, Prabhat, Campbell, Fischer, Cibulskis, Eisele, Li Liu & Mathers,(2010:6), about 41% of all under-five deaths occur among newborns; while WHO (2011), reported that about 8000 newborns die from preventable causes every day, and that almost 99% of global neonatal deaths occur in low- and middle-income countries, where Africa and south-east Asia share 70% of global neonatal deaths. In Rwanda, which is among the developing countries, the neonatal mortality rate was 21 deaths of newborns/1000 live births in 2012 (African Union Commission, 2013:15).

Ayaz and Saleem, (2010:1), confirmed that infections are the major cause of neonatal deaths; since they account for more than one third of neonates’ deaths. Furthermore, in developing countries where resources are limited, newborns admitted to neonatal units are at high risk of acquiring health care-associated infections because several factors known to facilitate the transfer of pathogenic organisms from patient to patient are common in these units (Asare, Enweronu-Laryea & Newman, 2009:352). The contaminated hands of nurses are a known vector in the transmission of potentially pathogenic organisms to hospitalized infants who are especially vulnerable to healthcare-associated infections (Ryan, 2012:5).
Since the increasing number of neonatal deaths can be prevented, a focus on infection induced mortality in early neonatal period is important in order to accelerate attempts to achieve the fourth millennium development goal. To reduce under-five mortality rate by two-thirds requires a decrease in deaths, especially those caused by infections, during neonatal period.

According to Rhee, Mullany, Subarna, Katz, LeClerq, Darmstadt and Tielsch (2008:2), the provision of low-cost interventions could reduce this burden by up to 70%. Literature shows that compliance to simple basic infection control measures could help a lot in reducing the rate of hospital acquired infections. The availability of the hand-washing/rub facility and its proper use before and after contact with each neonate needs special attention. Hand-washing with clean water and soap and/or use of alcohol based hand rubs has been recommended by WHO as a clinical practice before and after handling the infant in the postnatal period to prevent infection. Its importance cannot be undermined both in the delivery room and nursery (Mahmood, Fazalur Rehman, Chuhtai, 2008:240; Blencowe, Cousens, Mullany, Lee, Kerber, Wall, Darmstadt & Lawn, 2011:240). However, several studies have revealed that hand hygiene is poorly practiced among nurses (Vu Binh, 2007:56; Asare, et al., 2009:354; Al-Wazzan, Salmeen, Al-Amiri, Abul, Bouhaimed & Al-Taiar, 2011:328); the absence of hand-washing as a behavioural pattern and the decreased interest in its practical application were reported as major causes of poor hand-washing compliance (Korniewicz & Masri, 2008:87). Nurses constitute the largest percentage of health care workers, and according to Darawad, Al-Hussami, Almhairat and Manal Al-Sutari, (2012:643), they are the “nucleus of the health care system”. They spend more time with patients than any other health care workers, thus their compliance with hand-washing guidelines seems to be more vital in preventing the disease transmission among patients.
1.2 Problem statement

Previous research have shown that infections account as one of the significant leading causes of neonatal deaths, yet these deaths could be prevented by cost-effective interventions. According to Allegranzi and Pittet (2009:305), healthcare workers’ hands are seen to be the most common vehicle for the transmission of healthcare-associated pathogens from patient to patient within the healthcare environment. It is also suggested that hand-washing could be the leading measure for preventing the spread of antimicrobial resistance and reducing HCAIs, nevertheless healthcare worker compliance with optimal practices remains low in most settings (Allegranzi & Pittet, 2009:305).

In 2010, Rwanda like other developing countries in the world made a pledge, through her Minister of Health, to address healthcare associated infections (WHO, 2010:26). In addition, the Rwandan ministry of Health (RMoH, 2012:6-7) has developed clinical treatment guidelines for neonatology in which infection control is stipulated with emphasis on hand-washing and antisepsis. Prior to commencing this study, the researcher did not find any evidence that could determine the extent to which hand-washing is practiced among healthcare givers caring for newborns in Rwanda and more specifically in the Eastern province which accounts 27 neonates deaths /1000 live births (NISR, 2012: 104).
1.3 Objectives and research questions of the study

1.3.1 Objectives

The purpose of this study was to determine the compliance with hand-washing among nurses and midwives caring for newborn babies in Rwamagana Health Facilities.

Specifically the study sought to:

- Assess hand-washing compliance rates among nurses/midwives in delivery ward and nursery,
- Determine demographic characteristics, as well as cognitive characteristics (attitudes, perceived behavioural control, subjective norms and intentions) of nurses/midwives working in delivery ward and nursery in relation to hand-washing compliance.

1.3.2 Research questions

In order to achieve the above objectives the following research questions informed the study.

- What is the self-reported hand-washing compliance rate among nurses/midwives in delivery ward and nursery?
- Do nurses/midwives' demographic characteristics, attitudes, perceived behavioural, and intentions correlate with their hand-washing compliance?

1.4 Significance of the study

The study is relevant in diverse ways. Since the compliance of nurses and midwives to recommended hand hygiene guidelines could be subject to several factors, this study sought to determine the current compliance rates of hand-washing among nurses/midwives in Rwamagana
health facilities, Rwanda. The importance of the current study is based on the fact that it will contribute to filling the gap in literature with regards to hand-washing compliance among healthcare professionals caring for neonates. The findings emanating from this study might be a basis for health planners at institutional level to develop appropriate and targeted interventions that might improve their hand hygiene practices to prevent neonatal morbidity and mortality deaths due to healthcare-associated infections.

In addition, the results from the current study might be relevant for nursing education, in terms of reinforcement of the curriculum on infection control. This study may also serve as baseline for further researches in this area not only in the Eastern province but could be extended to other parts of the country.

1.5 Research methodology

A quantitative approach with self-administered questionnaire constituted the basic form of data collection. Data were collected from fifteen health facilities (one hospital and fourteen health centres in Rwamagana District). Nurses and midwives working in maternity and nursery wards in these health facilities constituted the population of the study. The researcher did not proceed to determine a sampling strategy because the whole population was considered for the study.

1.6 Definition of operational terms

- **Hand-washing**: refers to washing the hands with water and soap or with an antiseptic, and/or alcohol hand rub. In the context of this study, hand-washing is used interchangeably with hand-hygiene.
• **Hand-hygiene:** is a general term that applies to hand-washing, antiseptic hand-wash, antiseptic hand rub using gloves or surgical hand antisepsis (Vu Binh, 2007:24).

• **Hand-washing compliance** refers to washing the hands with soap and water or using alcohol-based hand rub as stipulated by the guidelines.

• **Nurse:** in the current study refers to a person who has underwent basic education in nursing studies of at least three years post secondary (registered nurse), or an associate nurse with secondary level of education.

• **Midwife:** refers to a person who has completed at least three years post secondary education in midwifery.

• **Attitudes:** this was contextualised in this study as how participants in the study valued hand-washing with regards to its effectiveness in the prevention of HCAIs in neonates.

• **Intentions:** refers to willingness to wash hands in clinical situations.

• **Healthcare-associated infections:** this refers to infectious status that hospitalized patients present other than the reason of their hospitalization. According to Auriti _et al._, 2003 in Ryan (2010:1) the time frame that helps to differentiate primary infections from infections that are newly acquired in the hospital is 48 hours.

1.7 **Outline of the thesis**

The thesis includes five chapters. Apart from the current chapter which is the general introduction to the study, chapter two provides a detailed review on studies and theoretical framework pertaining to hand-washing. Chapter three describes the methodology of the study as well as research instruments. In Chapter four, the results are presented and discussed. The last chapter, chapter five, provides the study’s conclusions and recommendations.
CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of extant relevant literature on the practice of hand-washing as an important means to prevent neonatal infections in healthcare settings. Resources and data sources that provide adequate information were accessed. Some of these include; databases of electronic journal articles and search engines such as CINALHL, MEDLINE, PubMed, Science direct and other websites of Health systems, World Health Organisation. Moreover, books, journals and past dissertations related to the topic were also consulted.

The literature review was organized under the following four areas:

- Vulnerability of newborns to healthcare-associated infections
- Hand-washing guidelines
- Hand-washing compliance among health care professionals
- Demographic characteristics and cognitive characteristics (attitudes, perceived behavior, subjective norms and intentions) of Health care professionals in relation with hand-washing

2.2 Vulnerability of newborns to healthcare-associated infections (HCAIs)

Newborns represent a unique and highly vulnerable patient population. Prematurity and lower birth weights in newborns are the most factors that help to understand their vulnerability to HCAIs (Polin, Denson, Brady, 2012: e1105; Ryan, 2012: 12). These infants have intrinsic factors such as an immature immune system and compromised skin or mucous membranes that increase
their vulnerability towards various infections. In addition, the immaturity of other organs such as the liver, kidney and lungs, any physiological instability or exposure to invasive devices and broad spectrum antibiotics can put infants in neonatal care units at risk of health care-associated infections (Polin et al., 2012; Ryan, 2012:13). Coffin and Zaoutis (2010:1126), distinguish three categories of transmission of HCAIs to newborns, namely; contact (direct or indirect), droplet (from large respiratory droplets that fall out of the air at a maximum distance of 3 feet) and airborne (from droplet nuclei, which can remain suspended in air for long periods and as a result travel longer distances). It is said that pathogen that affect the neonate residing in the neonatal intensive care unit (NICU) is determined at least in part, by the NICU environment and the hands of health care workers for example when performing evasive procedures such as intravenous access, parental nutrition, urinal catheterization, oro/naso-gastric tubes (Polin et al., 2012; Coffin & Zaoutis, 2010 ). While contact transmission of pathogenic organisms through the hands of healthcare workers is arguably a key factor causing infections, however, such transmissions are preventable. Research conducted by Pessoa-Silva, Dharan, Hugonnet, Touvenau, Posfay-Barbe, Pfister & Pittet,(2004:194), aimed at evaluating the dynamics of bacterial contamination of HCWs hands during routine neonatal care indicated a significant increase in bacterial load on the fingertips of nurses few minutes after the care is performed. The bacterial increase was mostly seen when the care involved contact with the neonate's skin, soiled diapers, respiratory secretions, after contact with neonates' equipment, and/ or after handling vascular access devices (Pessoa-Silva et al., 2004:194).

Pessoa-Silva et al., (2004:196) highlight that nurses who fail to clean their hands before or after performing a care, or between two procedures on the same neonate, might contaminate the cleaned site with pathogens from a soiled body site. Similarly, nurses may contribute to increase
the microorganisms in the environment of the neonates when touching equipment with soiled hands or gloves. Poor compliance with hand hygiene has been repeatedly pointed out as one of the major causes of outbreaks and transmissions of resistant microorganisms (Coffin & Zaoutis, 2010:1127). Indeed, the vulnerability of neonates to HCAIs stresses the importance of studying hand washing practice among health care workers. Therefore, a close attention to the patient care environment and clinical practice is necessary to reduce the risk of infections.

### 2.3 Hand washing guidelines

In 2009, WHO issued guidelines on hand hygiene in healthcare on the occasion of the launch of the “Save Lives: Clean Your Hands initiative” (Pittet, Allegranzi & Boyce, 2009). The guidelines comprise (but not limited to) what the experts called "My five moments for hand hygiene" which are as follows:

1. Before touching a patient

2. Before clean/ aseptic procedure

3. After body fluids exposure

4. After touching a patient

5. After touching patient surroundings (Pittet et al., 2009: 613).

Moreover, it is acknowledged that the use of gloves does not replace the need for hand hygiene by either hand-rubbing or hand-washing. One should put on gloves when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes, or non-intact and remove gloves after caring for a patient. The same pair of gloves must not be
used for the care of more than one patient. When wearing gloves, it is crucial to change or remove gloves during patient care if moving from a contaminated body site to another body site (including non-intact skin, mucous membrane or medical device) within the same patient or the environment (Pittet et al., 2009: 612). The ministry of health in Rwanda, based on WHO guidelines, developed neonatology clinical treatment guidelines for health facilities. The following are guidelines related to hand-hygiene during the care of a newborn:

- When entering the neonatal unit;
- Before clinical exam of the baby;
- After removing gloves / finishing examination;
- After contact with blood or other bodily fluids even if wearing gloves;
- Before any aseptic procedure;
- After touching any medical equipment including stethoscope;
- After contact with the newborn environment (e.g. incubator, clothes);
- Before leaving the ward

(Rwanda MoH, 2012:6-7).

2.4 Hand-washing compliance

Though hand-hygiene is regarded as the most effective way of controlling healthcare-associated infection, the importance of this procedure is not well recognized by health care providers. Results from studies using self-administered questionnaire indicated high compliance rates (Sax, Uckay, Richet, Allegranzi & Pittet, 2007; Tai, Mok, Ching, Seto & Pittet, 2009; Vu Binh, 2007; Al-Wazzan, Salmeen, Al-Amiri, Abul, Bouhaimed, Al-Taiar, 2011; Ryan, 2012), while findings
from studies using observation revealed poor HW compliance rates (Vu Binh, 2007; Al-Wazzan et al., 2011; Asare et al., 2009).

In a study conducted by Sax et al. in 2007, to quantify the different behavioral components of HCWs’ motivation to comply with HH in a healthcare institution with a 10-year history of HH campaigning, with an anonymous self-administered questionnaire, nurses (N=629) estimated their HH self-reported rate to be as higher as 90%. Majority of the nurses, about 85.7% (n=535), declared a compliance of 80% or greater (Sax et al., 2007:1270).

Furthermore, Tai et al., (2009) conducted a multi-center exploratory study to explore nurses and physicians’ perceptions of the importance and impact of HCAIs and HH. The results from their study indicated that overall, the mean score (± standard deviation, SD) for self-reported hand cleansing practice was 75.36 ± 1.63% (range 12.5–100%). Both nurses and physicians reported a high rate of hand cleansing practice after exposure to patient’s body fluids and a low rate before direct patient contact (Tai et al., 2009:321).

Similarly, Ryan, (2012) in her research entitled "Determinants of HH among Registered nurses caring for critically ill infants in the neonatal intensive care unit", reported that the mean of eight self-reported HH compliance items revealed an overall self-reported compliance of 94.96% (SD=5.69). Likewise, She stated that the highest HH rates occurred after exposure to patient body fluids (98.9%), followed by HH between touching two patients sequentially (98.67%), and before direct contact with a patient (98.22%). The lowest reported rates of HH occurred after touching an object within the patient's vicinity with a M= 84.56%, SD = 15.83 (Ryan,2012:49).

Also, Vu Binh (2007:54) conducted a correlational study of knowledge, attitudes and compliance of hand-hygiene among healthcare workers using both observational form and self-administered
From this study, hand hygiene compliance by self-report was high ($M=85.58$, $SD=16.98$) and ranked from one to one hundred percent. More than 50% of HCWs reported that they washed their hands more than 90%. It can be argued that compliance of hand hygiene shown by results from the observation was not satisfactory. Vu Binh (2007:54) reported that the mean of hand hygiene compliance was 43.76% ($SD=22$). Less than 25% HCWs had hand hygiene compliance less than or equal 27.27%. More than 50% of participants cleaned their hands less than or equal 44% of opportunities, and around 25% did so more than 60% opportunities. The same poor compliance to hand hygiene was reported by Asare et al. (2009:354), who conducted a study using an unobtrusive observation aimed at assessing the nature of patient contact and hand hygiene practices of nurses and physicians in neonatal intensive care unit in Ghana. The reported results showed that compliance to hand hygiene recommendations before and after patient contact was 15.4% versus 38.5% for physicians and 14.1% versus 9.9% for nurses. Similarly, Al-Wazzan et al. (2011) carried out a study to assess compliance with hand hygiene guidelines among nursing staff in secondary care hospitals in Kuwait, using both direct observation and self-administered questionnaire to collect data. Results indicated that self-reported hand hygiene compliance rate of 454 nursing staff who participated in their study 90% (Al-Wazzan et al., 2011:326). Their findings revealed that nurses consistently reported higher compliance after conducting patient care activities rather than before (Al-Wazzan et al., 201:326). The 33.4% hand-washing observed compliance rate by the researcher may be seen as controversial.

In view of the above, it can be deduced that self-reported hand-washing compliance among health care workers does not always reflect the real situation of hand-washing practice with
regards to HCAIs control. The observed hand-washing compliance, as revealed by the literature review, is poor.

2.5 Demographic characteristics related to hand-washing compliance

Several researches have been conducted on the demographic characteristics and behavioural determinants of hand-washing among healthcare workers, but few of these studies have been reviewed for the purpose of this study. Sax et al. (2007), Snow, White, Alder & Stanford (2006) and Tai et al. (2009) in their studies assessed the effect of gender on hand hygiene. Sax et al. (2007) used anonymous self-reported questionnaires among medical and nursing staff (N = 1041), while Snow et al. (2006) used observation for nursing students (N=60) in their research entitled Mentor's hand hygiene practices influence student's hand hygiene rates. The results from Sax et al. (2007:1271) showed that male staff were more likely to clean their hands less often than female staff. The results from Snow et al. (2006:21) indicated that there was an increase in hand-washing rates among female students over male students. Similarly, Tai et al. (2009:323) found that female HCWs washed their hands more frequently than males.

Age: no apparent correlation between age and hand-washing compliance was found in self-reported data from studies which included interdisciplinary HCPs as participants (Quiros, Lin, & Larson, 2007:3; Sax et al., 2007:1271; Tai et al., 2009:324). Likewise, Snow et al. (2006:20) did not find any association between age and hand-washing compliance.

Education: Tai et al. (2009:325) and Ryan (2012:65) did not find any difference in HH compliance among nurses who obtained a college diploma compared with those who obtained a university degree.
Experience: Quiros et al. (2007:3), Sax et al. (2007:1271), Tai et al.(2009:325) and Ryan (2012:64) maintain that experience (years of completion of basic training) and years of employment in the health facility were not significant predictors of hand-washing compliance.

HW promotional campaigns in the past and formal HW training after basic professional education were found to be independent predictors of HH by Sax et al. (2007:1271), who indicated that HCPs were more likely to practice HH if they had previous exposure to HH campaign. Furthermore, structured training in HH was reported to be an independent explanatory factor of good HH adherence among nurses (Sax et al., 2007:1271). However, the results reported by Tai et al. (2009:325), did not show that neither exposure to HH campaigns, nor formal HW training after basic education could significantly predict HH compliance. Similarly, Ryan (2012:64) did not find that exposure to HH campaigns was associated with HW compliance in her study on determinants of HH among registered nurses caring for critically ill infants in neonatal intensive care unit.

2.6 Conceptual Framework

The conceptual framework for the current study stemmed from the Theory of Planned Behavior (TPB). TPB has been adapted earlier from the Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein in1967 (Ajzen, 1985: 11-39).

Though TPB is developed originally for use in social psychology, it has been used in nursing to describe and explain “health promoting and health protecting behaviors” (Pender, 2002 in Ryan, 2012:6). A host of scholars (Pessoa-Silva et al., 2005; Vu Binh,2007; Quiros et al., 2007; Nicol, Watkins, Donovan, Wynaden & Cadwallader, 2009; Allegranzi & Pittet, 2009; Tai et al., 2009;
Ryan, 2012) have also used the TBP to predict and understand hand hygiene practices among healthcare professionals.

As mentioned previously, TPB describes the observed behavior as predicted by the intentions to perform the behavior. The intentions are also influenced by behavioral attitudes, subjective norms and perceived behavioral control. This was reported by Pessoa-Silva, Posfay-Barbe, Pfister, Touveneau, Perneger & Pittet (2005:308), who, in their study about attitudes and perceptions towards HH among HCWs caring for critically ill neonates, found that positive attitudes, behavioral control over the difficulty to perform hand hygiene, and a positive perception of superior values were significantly associated with intention to comply with hand hygiene. Nevertheless, other studies have shown that those cognitive characteristics, namely attitudes, perceived behavioral control and subjective norms could have, as well as intentions, direct independent prediction of HH behavior (Vu Binh, 2007; Nicol, Watkins, Donovan, Wynaden & Cadwallader, 2009; Allegranzi & Pittet, 2009; Tai et al., 2009; Ryan, 2012).

With respect to the current study, the conceptual framework was built on the idea of TPB, but did not apply the original theory. Concepts such as attitudes, perceived behavioural control, subjective norms and intentions were used as direct predictors to HW.

Behavioural attitude is defined by Ajzen (1985) as the level to which performance of the behavior is valued, either positively or negatively. For this study, attitudes were contextualized as nurses midwives' perceptions of different positive and negative effects of handwashing in relation to infection prevention in neonates. The attitudes are determined by demographic characteristics and behavioural beliefs of the interest of nurses/midwives to the expected outcomes of hand-washing. Indeed, studies (Darawad et al., 2012; Pessoa-Silva et al., 2005; Vu
Binh, 2007; Sax et al., 2007; Quiros et al., 2007) have described positive attitudes towards hand-washing among health care workers as independent predictors to HH compliance. Quiros and colleagues conducted a study (N= 1,359) among critical care physicians, nurses and allied health care professionals in 39 US hospitals regarding their attitudes toward the hand hygiene guideline from Center for Disease Control (CDC). They found that healthcare professionals with positive attitudes toward the guideline were more likely to report its implementation (OR = 1.11, CI = 1.06 -1.16, p < .001). Abd Elaziz & Bakr (2009: 21) carried out study to assess knowledge, attitude and practice of hand washing among health care workers in University hospitals in Cairo showed that 92% of the nurses believed that hand-washing can lower HAIs rates more than any other method of infection control. It was also noted that 97.3% of the nurses claimed that administrative orders and continuous observation can improve hand washing practices. Abd Elaziz & Bakr (2009: 21) further reported that 96% of nurses maintained that hand-washing prevented health care personnel from infections. Darawad, Al-Hussami, Almhairat & Al-Sutari (2012:644-645) surveyed 198 Jordanian nurses' on hand-washing beliefs, attitudes and compliance. Their findings state that the mean score for beliefs about hand-washing outcomes among nurses was 5.51 out of 7 (SD, 1.59). It was found that beliefs, attitudes and skin assessment were the strongest variables to predict hand-washing compliance. Nurses’ beliefs relatively had the highest prediction effects (Darawad et al., 2012: 645).

Subjective norms are considered as the perceived social pressure to engage or not in a behavior (Ajzen,1985: 1-39). Subjective norms are determined by normative beliefs which refer to the perceived behavioral expectations (Ajzen,1985), i.e. nurses' perceptions of the social pressure exercised by others, both superiors and peers, to perform HW. According to Sax et al.(2007) and Ryan (2012), manager's expectation had no impact on self-reported HH compliance, while Tai et
al. (2009: 325) argued that perceived managerial expectations was associated with higher levels of self-reported HH compliance among nurses and physicians in Hong Kong hospitals. In addition, literature showed that nurses’ self-reported HH compliance was associated with perceptions of colleagues' behavior. Studies confirm that compliance rates may be higher when colleagues have good HW practices (Sax et al., 2007; Snow et al., 2006; Tai et al., 2009; Ryan, 2012).

Sax et al. (2007:1271), reported that HCPs (N=1042) were 1.8 times (CI=1.0-3.2, p  = 042) more likely to report higher HH adherence rates when they perceived that their colleagues expected good HH adherence.

Perceived behavioural control is the conviction that one could execute the behavior required to produce the outcome. Ajzen (1985) explained perceived behavioural control as perceptions of peoples’ ability to perform a given behavior. The perceived behavioural control is determined by control beliefs (i.e. beliefs about the presence of factors that could influence the practice of hand washing). Sax et al. (2007:1271) found that healthcare professionals reported high rates of hand-washing compliance when they perceived that hand-washing wash easy to perform. Similarly, Tai et al. (2009: 326) stated that perceived behavioural control was associated with nurses' and physicians' self-reported hand hygiene performance. Likewise, Ryan, (2012:61) and Pessoa-Silva et al., (2005:308) state that nurses who perceived that HH was easier to perform were more likely to report performing HH when compared with those who perceived that HH was more difficult to perform.
2.7 Summary of literature

The literature review has provided considerable information about neonates' vulnerability to HCAIs, and the pertinence of washing hands to prevent the acquisition of infections. Studies conducted to assess HH performance among HCWs using self-administered questionnaire have reported higher HH compliance rates (Sax et al., 2007; Tai et al., 2009; Vu Binh, 2007; Al-Wazzan et al., 2011; Ryan, 2012), as compared to HH compliance rates reported from observational approach (Vu Binh, 2007; Al-Wazzan et al., 2011; Asare et al., 2009).
Also, the relationships between HCWs’ HH practice and their demographics and cognitive characteristics have been reviewed. Most of the studies considered in this study do not indicate that HH compliance was associated with demographic characteristics such as age; education level; experience and years of employment in HF; HW promotional campaign, and formal HW training (Quiros et al., 2007:3; Sax et al., 2007:1271; Tai et al., 2009:324, Ryan, 2012:65). However, gender was found to influence HH compliance of HCWs (Sax et al., 2007:1271; Snow et al., 2006:21; Tai et al., 2009:323). The reviewed studies concur that attitudes were unique independent predictor of HH compliance among HCWs (Darawad et al., 2012; Pessoa-Silva et al, 2005; Bui Vu Binh, 2007; Sax et al., 2007; Quiros et al., 2007; Abd Elaziz & Bakr, 2009), while there was controversy about the association between HH practice and subjective norms. Sax et al.(2007) and Ryan (2012) did not find any impact of manager's expectation on self-reported HH compliance. However, Tai et al. (2009) confirmed that perceived managerial expectations was associated with higher self-reported HH compliance rates. In addition, studies confirm that compliance rates may be higher when colleagues have good HW practices (Sax et al., 2007; Snow et al., 2006; Tai et al., 2009; Ryan, 2012). Perceived behavioral control was another concept reviewed in literature. Four studies reviewed agreed that healthcare professionals reported high rates of hand-washing compliance when they perceived that hand washing wash easy to perform (Sax et al., 2007; Tai et al., 2009; Ryan, 2012; Pessoa-Silva et al., 2005). Most of the studies reviewed in this study on HW were conducted in western countries with only two in African countries. It is thus important to conduct a study on Rwandan nurses/midwives working with neonates-considered as a vulnerable population. The current study therefore enhances the researcher's understanding of the demographic and TPB cognitive factors associated with nurses/midwives’ compliance with HW guidelines.
CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction
This chapter presents the methodology adopted in this study. It offers a detailed description and explanation of the research design, study setting, participants, research instrument, data collection and data analysis, as well as ethical considerations.

3.2 Research design
The research design of the current study is a descriptive, quantitative design. Grove, Burns & Gray (2013:23), have defined quantitative research as "a formal, objective, systematic process implemented to obtain numerical data for understanding the world". This approach is appropriate for research studies that intend to determine the relationship between two or more variables. According to Grove, Burns & Gray (2013:215), a descriptive design describes what exists; it determines the importance or significance and the frequency with which something occurs. In the context of nursing, a descriptive design is appropriate when current practice seems not to be sufficient, or when the researcher has identified area of concern that needs to be investigated (Grove, Burns & Gray, 2013:217). In respect to the current study, descriptive design was adopted to determine the hand-washing compliance rates among nurses/midwives in delivery ward and nursery, as well as to find out the relation between demographic characteristics, perceived behavioural control, attitudes and intentions and their hand-washing compliance.
3.3 Research setting

This study was conducted at Rwamagana district hospital and public health centres in Rwamagana district. Rwamagana district is one of seven districts of Eastern province in Rwanda. Rwamagana hospital is a public health facility which hosts 14 Health centres serving a population of 318,238 inhabitants. The average number of deliveries per month is estimated at 305 and according to the annual report of Rwamagana hospital (Rwamagana hospital, 2012), 160 (4.39%) neonatal deaths were reported for 2012.

3.4 Study population and sampling

A population or target population is defined as the entire set of elements (individuals, objects, or substances) that meet the criteria of sampling for a study (Burns & Grove, 2005:40). The study population and sample included all nurses and midwives currently working in delivery room, early postpartum ward or neonatal unit of Rwamagana health facilities and who would be willing to participate in the study. For the purpose of this study, nurses and midwives were not considered as separate professionals, as they performed the same tasks in health facilities. Since the number of midwives is very limited in Rwanda, every nurse/midwife had an equal chance of participating in the study. As defined by Grove et al. (2013:351), sampling is deciding on people, events, behaviours or other elements in which to conduct a study within a target population; sampling decisions have a major impact on the meaning and generalizability of the findings. According to Grove et al. (2013:353-354), a representative sample must be similar to the target population. However, for a small target population as in this study, sampling was not necessary since the entire population was used. Therefore, results from this study will be generalized to nurses and midwives of Rwamagana health facilities in the eastern Province where the study was conducted. A total target population of 168 nurses and midwives were considered for the survey.
However, the number of participants was limited to 139 as 29 were not at post at time the study was conducted, because they were on training outside their working health facility and others were on annual/maternity leave.

3.5 Tools for data collection

A self-administered questionnaire was used in this study. It was adapted from existing hand hygiene instrument (see Appendix XIV) originally developed by Tai and co-authors in 2009, and permission to use the questionnaire was provided (Appendix XIII). The modified questionnaire has a section on socio demographic characteristics and five scales as variables of the concepts (attitudes, perceived behavioural control, subjective norms, intentions and self-reported hand-washing). The section on demographics included 10 items, while the variables related to subjective norms were 5. The other four scales were composed of 8 sub-scales each. The whole modified questionnaire included 50 items, while the original was made of 65 items. Questions were measured on alikert-scale ranging from 1 (lowest rated) to 7 (highest rated) for questions related to attitudes and perceived behavioural control, others from 0% to 100% with increase of 10% (intentions toward HW and self-reported HW compliance).

3.6 Reliability and validity

3.6.1 Reliability

Reliability refers to the accuracy and consistency of information obtained in a study. The concept of reliability is also important in interpreting the results and performing statistical analyses. Statistical reliability refers to the probability that the same results would be obtained with a completely new sample of subjects (Polit& Beck, 2008). The original questionnaire took approximately 10 minutes to complete; it was originally administered to healthcare professionals.
in Hong Kong. The reported internal consistency for the overall questionnaire was very good (Cronbach's = 0.95), the coefficients for the scales ranged from 0.84 to 0.91 (Tai et al. 2009:321). The self-administered questionnaire was translated by a professional translator into French so as to improve the reliability of the responses by the respondents, as most of the participants completed their basic nursing education in French. The French version of the questionnaire was again translated to English to assess the accuracy of the translation in French and to ascertain if the meaning of items was preserved. Reliability of the modified questionnaire was enhanced through internal consistency using coefficient alpha or Cronbach’s alpha, and 0.7 will be considered reliable.

3.6.2 Validity
Validity is a concept that broadly concerns the soundness of the study’s evidence that is, whether the findings are cogent, convincing and well grounded. It is an important criterion for assessing the methods of measuring variables (Polit & Beck, 2008). The content validity of the questionnaire has been tested by other researchers (Tai et al., 2009; Ryan, 2012). For this study, as the original questionnaire was modified, the adapted questionnaire was assessed for validity and reliability. The content validity of the questionnaire was reviewed by the researcher's supervisor to assess if it was aligned with the study objectives. The instrument was pre-tested on five nurses working in nursery at the study site. The five respondents did not raise any challenge in terms of understanding the items. The returned questionnaire responded to the research objectives and was included as part of the study sample.

3.7 Data collection procedure
On approval of the study by the relevant authorities, written consent was sought from all participants. Firstly, the researcher contacted authorities in charge of service in the facilities to
provide them with detailed explanation of what the research was all about. The authorities in charge helped to inform nurse and midwives that a study was being conducted, that someone will approach them individually to request their participation during the day. Participants were informed about the research and the importance of their voluntary participation. Self-administered questionnaires were then handed to participants who were requested to fill in when they have time during the day. Those who did not have enough time on that very same day were requested to hand it completed to the research assistant the following day. The data collection process required the involvement of a research assistant due to the nature of the study and time constraint. One final year nursing student was trained as a research assistant for this study in order to facilitate a good understanding of the study in general, aim of the study and understanding of questions addressed to participants. The ethics of the study were also explained to the research assistant. The research assistant's role was to collect questionnaires from participants and to assist respondents with difficulties that may be encountered during the completion of questionnaires. To ensure accuracy of responses, participants were assured that all responses will be completely confidential. All the instructions were provided before data collection to allow clarification. The questionnaires were administered to participants at their convenience during day shifts (8:30 – 16:30).

3.8 Data analysis

The data collected from nurses and midwives were captured and analyzed using the statistical package for social sciences (SPSS), version 21. Data were processed in terms of percentages and frequencies, and were presented in the form of bar charts, graphs and tables including univariate analysis. Correlational analysis (i.e. bivariate analysis) was carried out as well to measure the association between variables (dependent: hand washing practice and independent: demographic
characteristics of participants, and variables related to the context). The independent samples t-test was used to compare the scores on HW self-reported compliance for continuous variables with two outcomes. The researchers’ aim was to find out how the independent variables affect the dependent variable; hence a multiple regression model was used in this case.

3.9 Ethical considerations

In order to conduct this study, the researcher needed ethical clearance from University of the Western Cape in South Africa and from Kigali Health Institute in Rwanda, as well as permission from the management of Rwamagana Hospital as the direct supervisory unit of health facilities in the district. The researcher submitted her research proposal at the same time to the Ethics Committee of University of the Western Cape and the Institutional Review Board (IRB) at Kigali Health Institute for review and approval.

In addition, oral and written consent were sought from nurses and midwives. The aim of the study was well explained by the research assistant to all relevant parties.

Participants were assured of confidentiality of information provided, and that their names will not be used in the questionnaires and during the study process to ensure anonymity. They were also informed that it was their right to withdraw from the study at any time they want. This was to ensure that participants’ rights were protected, and that participation in the study was voluntary. The information provided through self-report will be kept safely, and will be destroyed five years after writing the report for the purpose of privacy.
CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents the results and summary of statistical analysis used to evaluate the research objectives. The objectives were: (1) to assess the hand-washing compliance rate among nurse midwives in delivery ward and nursery; (2) to determine demographic characteristics, as well as cognitive characteristics (attitudes, perceived behavioural control, subjective norms and intentions) of nurse midwives working in delivery ward and nursery with regards to handwashing. Of the 139 self-administered questionnaires delivered to nurses and midwives from Rwamagana Health facilities, 134 have been completed and returned to the researcher giving a rate of 96.4%. Four questionnaires were not completed and one questionnaire was not considered for analysis as the respondent was an auxiliary nurse, and thus did not fulfill the criteria to participate in the study.

4.2 Accuracy of data

After the completion of data collection and entry, data cleaning was done to ascertain if there were errors. The data were also screened to find out if there were no missing values. The entire database was reviewed more than once for this purpose. The study tool was adapted from the hand hygiene instrument developed by Tai et al. (2009), which had a good internal consistency with a Cronbach's alpha value of .95, with coefficients for the scales ranging from .84 to .91. Normally, the Cronbach coefficient of items’ scale should be above .70 (DeVellis 2003 in Pallant, 2011: 97). The modified tool was assessed for internal consistency reliability and Alpha coefficient for the multi-item scales from the adapted questionnaire used in this study ranged from .88 for Self-reported HW to .91 for Perceived behavioural control, which indicates that the
scale that was used has a good internal consistency (Table 4.1). Values from inter-item correlation for all subscales were positive, showing that items were measuring the same variable. In addition, the corrected item-total correlation values were more than .3, indicating that each item was correlated with the total score (Pallant, 2011: 100).

Table 4.1: Statistical reliability

<table>
<thead>
<tr>
<th>Variables</th>
<th>Nº items</th>
<th>Cronbach' Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes</td>
<td>8</td>
<td>.89</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>8</td>
<td>.91</td>
</tr>
<tr>
<td>Intentions</td>
<td>8</td>
<td>.90</td>
</tr>
<tr>
<td>Self-reported HW</td>
<td>8</td>
<td>.88</td>
</tr>
</tbody>
</table>

4.3 Description of demographic characteristics of participants and variables measuring participants’ perception towards HW

As previously mentioned, participants recruited for this study were 134 from which 87.3% (n=117) were nurses and 12.7% (n=17) were midwives. Among respondents, 65.7% (n=88) were female and male represented 34.3% (n=46). The majority of participants were aged between 21-40 years (85.1%, n=104). Overall, 70.9% of respondents had more than 5 years of professional experience whereas 45.6% were employed in the health facility for more than 5 years. With regards to education, the majority (74.6%, n = 100) of respondents reported their highest level of education as secondary certificate (A2), compared to 18.7% (n = 25) of the sample who had Advanced diploma (A1) and to 6.7% (n=9) with degree (A0). The results showed that 64.5% of participants (n=86) did not get any formal training on hand-washing after completion of their basic education, compared to 40.3% (n=54) who experienced a hand washing promotional campaign in the past. Table 4.2 gives a global picture of the frequency distribution of the main socio-demographic characteristics of respondents.
Table 4.2: Frequency distribution of respondents’ socio-demographic characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>88</td>
<td>65.7</td>
</tr>
<tr>
<td>Male</td>
<td>46</td>
<td>34.3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-30</td>
<td>49</td>
<td>36.6</td>
</tr>
<tr>
<td>31-40</td>
<td>65</td>
<td>48.5</td>
</tr>
<tr>
<td>41 and above</td>
<td>20</td>
<td>14.9</td>
</tr>
<tr>
<td><strong>Qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>100</td>
<td>74.6</td>
</tr>
<tr>
<td>A1</td>
<td>25</td>
<td>18.7</td>
</tr>
<tr>
<td>A0</td>
<td>9</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Profession</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses</td>
<td>117</td>
<td>87.3</td>
</tr>
<tr>
<td>Midwives</td>
<td>17</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Years since completion of basic professional studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>31</td>
<td>23.1</td>
</tr>
<tr>
<td>5-9</td>
<td>56</td>
<td>41.8</td>
</tr>
<tr>
<td>10 and above</td>
<td>47</td>
<td>35.1</td>
</tr>
<tr>
<td><strong>Years of employment in the Health facility?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>73</td>
<td>54.5</td>
</tr>
<tr>
<td>5-9</td>
<td>47</td>
<td>35.1</td>
</tr>
<tr>
<td>10 and above</td>
<td>14</td>
<td>10.4</td>
</tr>
<tr>
<td><strong>HW promotional campaign in the past?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>80</td>
<td>59.7</td>
</tr>
<tr>
<td>Yes</td>
<td>54</td>
<td>40.3</td>
</tr>
<tr>
<td><strong>If yes, how many years past? (n = 52)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>43</td>
<td>81.1</td>
</tr>
<tr>
<td>5 and above</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td><strong>Formal hand hygiene training after your basic education?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>86</td>
<td>64.2</td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>35.8</td>
</tr>
<tr>
<td><strong>If yes, how many years past? (n=47)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>43</td>
<td>91.5</td>
</tr>
<tr>
<td>5 and above</td>
<td>4</td>
<td>8.5</td>
</tr>
</tbody>
</table>
Hand washing was reported to be top priority for the top management of health facilities by 73.1% (n=98) of respondents, compared to 26.9% (n=36) whose view was that the top management of their health facilities do not consider hand washing as top priority in prevention of HCAIs in Newborns. With regards to how they ranked hand washing, 83.6% (n=112) reported raking hand washing as top priority, 16.4% (n=22) of them viewing it as not a top priority. The ranking by the management of the service (maternity) was perceived as top priority by 72.4% (n=81) of the respondents, whereas 39.6% (n=53) were thinking hand washing was not a top priority for their colleagues nurses and midwives (Table 4.3).

Most respondents, about 79.1%, reported high hand-washing compliance rates of 80%. In general, hand washing compliance rate by colleague nurses and midwives ranged between 10% to 100 percent. However, a total of 44.8% of respondents implied that averagely, hand washing compliance by colleagues was less than 80% (Table 4.3).

Table 4.3: Frequency distribution of respondents' perceptions towards HW

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW as ranked by the top management of the Health facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top priority</td>
<td>98</td>
<td>73.1</td>
</tr>
<tr>
<td>Top 2-5 priorities</td>
<td>33</td>
<td>24.6</td>
</tr>
<tr>
<td>Lower than 5th priority</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>HW as ranked by the manager of Maternity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top priority</td>
<td>97</td>
<td>72.4</td>
</tr>
<tr>
<td>Top 2-5 priorities</td>
<td>31</td>
<td>23.1</td>
</tr>
<tr>
<td>Lower than 5th priority</td>
<td>6</td>
<td>4.5</td>
</tr>
<tr>
<td>HW as ranked by respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top priority</td>
<td>112</td>
<td>83.6</td>
</tr>
<tr>
<td>Top 2-5 priorities</td>
<td>21</td>
<td>15.7</td>
</tr>
<tr>
<td>Lower than 5th priority</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>HW as ranked by colleagues nurses/midwives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top priority</td>
<td>81</td>
<td>60.4</td>
</tr>
<tr>
<td>Top 2-5 priorities</td>
<td>49</td>
<td>36.6</td>
</tr>
<tr>
<td>Lower than 5th priority</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>------------------------</td>
<td>---</td>
<td>-----</td>
</tr>
</tbody>
</table>

Self-reported HW compliance (%)

| < 80 | 28 | 20.9 |
| ≥ 80 | 106 | 79.1 |

Colleagues' HW compliance (%)

| < 80 | 60 | 44.8 |
| ≥ 80 | 74 | 55.2 |

### 4.4 Self-reported HW compliance in relation to socio demographic characteristics

As per respondent's response on HW compliance, the bar graph (Figure 4.2) indicates that males reported higher HW compliance rates for themselves than females. The difference is more observed in the two age groups of more than 30 years.

![Bar graph showing self-reported HW compliance in relation to gender and age group of respondents.](image)

**Figure 2:** Descriptive statistics of self-reported HW compliance in relation to gender and age group of respondents.
The results displayed in Figure 4.3 reveal that there is a difference in self-reported HW compliance rates among participants according to their level of education and whether they benefited from a formal HH training after basic education or not. A1 nurses reported higher HW compliance rates than the other two groups. A2 nurses who benefited from a HW formal training reported high HW compliance rates compared to A2 nurses who did not have a HH formal training.

Figure 3: Descriptive statistics of self-reported HW compliance in relation to education level and formal training on HW after basic education.
4.5 Hand-washing practices and perceptions of respondents

Respondents reported high rates of HW. Overall HW practice (for 8 items) and summary of self-reported HW compliance are; (M±SD= 82.00±13.60, MD= 85; M±SD= 82.84±12.30, MD= 80, respectively). Relatively high rates of HW compliance for their colleagues (M±SD= 75.19±15.34, MD= 80) were also reported. Scores for attitude (M±SD= 6.25±1.07, MD=6.625), perceived behavioural control ((M±SD= 6.104 ± 0.98, MD=6.25), intentions to perform HW (M±SD= 88.87± 12.75, MD= 93.125) were high as presented in (Table 4.4).

To answer the first research question, whereby participants were asked to report the percentage of time they performed HW during the eight clinical situations they were given, descriptive statistics were used. The highest reported rate of hand-washing was HW after exposure to the newborn's body fluids (M= 89.33%; SD= 14.878), followed by HW after removing gloves used for newborn care (M= 82.84%; SD= 17.019) and HW after direct contact with the newborn (M= 82.54%; SD= 18.218). The lowest HW reported rate being after touching an object in the vicinity of the patient (73.43%; SD=22.81).
Table 4.4: Descriptive statistics of nurses/midwives' response to self-reported HW compliance, attitudes, perceived behavioural control, intention to wash hands and HW compliance by colleagues.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported HW compliance (%)</td>
<td>82.00 ± 13.60</td>
<td>85</td>
<td>63.75</td>
</tr>
<tr>
<td>Overall mean (8 item)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HW before direct contact with NB (%)</td>
<td>81.79 ± 19.84</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>HW after direct contact with NB (%)</td>
<td>82.54 ± 18.22</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>HW before touching clean site during NB care (%)</td>
<td>81.49 ± 18.00</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>HW after exposure to the NB's fluids (%)</td>
<td>89.33 ± 14.88</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>HW after removing gloves used for NB care (%)</td>
<td>82.84 ± 17.02</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>HW between touching 2 patients (eg, delivering mother and care of NB) (%)</td>
<td>82.46 ± 18.33</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>HW after touching an object of the patients (%)</td>
<td>73.43 ± 22.81</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>HW between touching patient's groin and subsequently examining stomach contents (%)</td>
<td>82.16 ± 18.12</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>Attitudes (1= Not effective at all; 7 = extremely effective)</td>
<td>6.25 ± 1.07</td>
<td>6.63</td>
<td>5.75</td>
</tr>
<tr>
<td>Perceived behavioural control (1= extremely difficult; 7= very easy)</td>
<td>6.104 ± 0.98</td>
<td>6.25</td>
<td>4.75</td>
</tr>
<tr>
<td>Intention (%)</td>
<td>88.92 ± 12.75</td>
<td>93.13</td>
<td>60</td>
</tr>
<tr>
<td>Respondent's self-reported HW practice (%)</td>
<td>82.84 ± 12.30</td>
<td>80</td>
<td>63.75</td>
</tr>
<tr>
<td>HW compliance by colleagues (%)</td>
<td>75.19 ± 15.34</td>
<td>80</td>
<td>90</td>
</tr>
</tbody>
</table>
The second research objective of the study sought to determine the extent to which demographic characteristics, attitudes, perceived behavioural control, subjective norms and intentions influenced handwashing compliance. To address this research objective, univariate and multivariate analyses were used.

A Pearson correlation analysis was done to determine the relationship between self-reported HW compliance and continuous variables such as age, education level, years after completion of basic professional studies, years of employment in the current health facility, attitudes, perceived behavioural control, intentions and HW compliance by colleagues’ nurses/midwives. The results in table 4.5 indicate that self-reported HW compliance is positively correlated with attitudes ($r = 0.388$, $p < 0.01$), Perceived behavioural control ($r = 0.261$, $p < 0.01$), Intentions ($r = 0.576$, $p < 0.01$), and HW compliance by colleagues nurses and midwives ($r = 0.493$, $p < 0.01$). The remaining variables were not statistically associated with respondents’ self-reported HW compliance.

**Table 4.5: Pearson correlation analysis**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Self-reported HW compliance</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Age of respondent</td>
<td>-.107</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Education level of respondent</td>
<td>-.099</td>
<td>.042</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Years after completion of basic profession studies</td>
<td>-.062</td>
<td>.484**</td>
<td>-.219*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Years of employment in this Health facility</td>
<td>-.080</td>
<td>.440**</td>
<td>-.179</td>
<td>.514**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Attitudes</td>
<td>.388**</td>
<td>-.057</td>
<td>-.145</td>
<td>-.051</td>
<td>-.166</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) Perceived behavioral control</td>
<td>.261**</td>
<td>-.040</td>
<td>-.179*</td>
<td>.152</td>
<td>.072</td>
<td>.435**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) Intentions</td>
<td>.576**</td>
<td>-.121</td>
<td>-.045</td>
<td>-.109</td>
<td>-.267**</td>
<td>.493**</td>
<td>.323**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(9) HW compliance by colleagues</td>
<td>.493**</td>
<td>-.167</td>
<td>-.179*</td>
<td>-.086</td>
<td>-.109</td>
<td>.172*</td>
<td>.211*</td>
<td>.436**</td>
<td>1</td>
</tr>
</tbody>
</table>
A comparison of self-reported mean scores for two different groups was also conducted using an independent-samples t-test. The results (see Table 4.5) revealed that there was a statistically significant difference in mean scores' HW self-reported between nurses (M = 662.99, SD = 106.846) and midwives (M = 608.24, SD = 113.756; t(132) = 1.959, p = .050); between respondents who perceived that HW was ranked as top priority by top manager of the HF (M = 676.94.67, SD = 100.364) and respondents who perceived that HW was ranked as Not top priority by top manager of the HF (M = 599.17, SD = 115.055; t(132) = 3.852, p = .000); between respondents who perceived that HW was ranked as top priority by manager of the service (M = 671.75, SD = 103.047) and respondents who perceived that HW was ranked as Not top priority by manager of the service (M = 614.86, SD = 114.227; t(132) = 2.772, p = .006); between respondents who ranked HW as top priority (M = 665.63, SD = 99.764) and respondents who ranked HW as Not top priority by themselves (M = 607.27, SD = 139.461; t(132) = 2.337, p = .021) and between respondents who perceived that HW was ranked as top priority by colleagues (M = 673.83, SD = 95.650) and respondents who perceived that HW was ranked as Not top priority by colleagues (M = 628.87, SD = 122.406; t(132) = 2.378, p = .019).

The independent-samples t-test was done for other categorical variables with two outcomes such as gender, having had formal HW training after basic education, and having experienced a HW promotional campaign. No statistically significant difference was observed in mean scores' HW self-report among these mentioned groups as their p-values were high (more than 5% level of significance).
Table 4.6: Independent Samples Test

<table>
<thead>
<tr>
<th>Self-reported HW practice</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>Df</td>
</tr>
<tr>
<td>HW rank by the top manager of the health facility</td>
<td>3.852</td>
<td>132</td>
</tr>
<tr>
<td>HW rank by the manager of the service</td>
<td>2.772</td>
<td>132</td>
</tr>
<tr>
<td>HW rank by yourself</td>
<td>2.337</td>
<td>132</td>
</tr>
<tr>
<td>HW rank by colleagues</td>
<td>2.378</td>
<td>132</td>
</tr>
</tbody>
</table>

4.6 Multiple Regression

Multiple regression analysis was used to assess the power of variables that were used in previous studies, namely profession; attitudes towards HW; intention to wash hands, difficulty or easy to wash hands; perceptions on how HW was ranked by top management of the HF; perceptions on how HW was ranked by manager of the service; perceptions on how HW was ranked by respondents themselves; perceptions on how HW was ranked by colleagues and HW compliance by colleagues, to predict HW compliance among respondents. All the independent variables were entered into the equation at the same time. Only variables that were significant at 5% level were considered, others were deleted as they were not statistically significant predictors. The researcher has chosen this model of analysis based on the fact that the dependent variable (self-reported HW compliance) was continuous.
The model as a whole explained 42.2% (.422 *100) of the variance in the dependent variable (self-reported HW compliance) (Table 4.8). The ANOVA test indicated that the model as a whole (including all types of variables) was statistically significant \[F(3, 130) =31.598; p < 0.0005\].

**Table 4.8: Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.649</td>
<td>.422</td>
<td>.408</td>
<td>83.725</td>
<td>.422</td>
<td>31.598</td>
<td>3</td>
<td>130</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Predictors: HW compliance by colleagues nurses and midwives, Attitudes, Intentions

The model (Table 4.9) revealed that the only three variables which were making a statistically significant contribution to the prediction of self-reported HW compliance were attitudes, intentions, and HW compliance by colleagues. The results indicated that intentions was found to have the strongest prediction to self-reported HW compliance (B = .390; SE= .090, p < .0005), HW compliance by colleagues showed a relatively strong prediction to self-reported HW compliance (B= 2.175; SE= .527, p < .0005) than attitudes (B = 1.957; SE= .970, p = .046).
Table 4.9: Standard linear regression for Self-reported HW compliance

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients</th>
<th>95.0% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>Attitudes</td>
<td>1.95'</td>
<td>.970</td>
</tr>
<tr>
<td>Intentions</td>
<td>.390</td>
<td>.090</td>
</tr>
<tr>
<td>HW compliance by colleagues</td>
<td>2.175</td>
<td>.527</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Self-reported HW compliance

4.7 Summary of the findings

The findings related to the purpose of the study were presented in this chapter. The self-administered questionnaire has been analyzed using various statistical techniques such as frequencies, correlation among variables, T-test and linear multiple regression. In general, the results show that nurses midwives reported high HW compliance rates. The highest reported rate of hand-washing was HW after exposure to the newborn's body fluids, while results revealed that nurses tend to less perform HW after touching an object in the vicinity of the patient. Correlation statistics indicated that cognitive factors, namely; attitudes, perceived behavioral control and intentions toward HW, as well as HW compliance by colleagues were positively correlated with self-reported HW compliance.

Also, statistical test showed that there was an association between nurses’ perceptions on how highly HW was ranked, by top management of HF, management of the service, by themselves and colleagues and their self-reported HW compliance rates. However, no relationship was found between nurses' demographic characteristics and their self-reported HW compliance.
Nevertheless, the outcome of a multiple regression analysis indicated that 3 factors had power to predict hand-washing among participants, namely; attitudes, intentions and HW compliance of colleagues. The findings are discussed in the next chapter.
CHAPTER FIVE:

DISCUSSION OF RESULTS

The purpose of this study was to determine compliance with hand-washing among nurses and midwives caring for newborn babies in Rwamagana health facilities. Furthermore, the study sought to ascertain if there was any relationship between demographic characteristics and cognitive characteristics (attitudes, perceived behavioural control, subjective norms and intentions) of nurses and midwives, and their self-reported hand-washing compliance rates. To this end, this chapter discusses the final results of the study, comparing the findings with similar studies conducted previously by other researchers, in order to report conclusive findings. Finally, recommendations are formulated and conclusion drawn.

5.1 Research objective 1: HW compliance rates

With regards to the research objective related to HW compliance rates, respondents in the current study reported high rates for themselves (M±SD= 82.00±13.60). A compliance rate of 80% or greater was declared by most of the participants in the study (79.1%). This is similar to findings reported from other previous studies that used a self-administered questionnaire to measure HW compliance among nurses. A study carried out to explore nurses and physicians' perceptions of the importance and impact of HCAIs and HH indicated that overall, the mean score for self-reported hand cleansing practice was 75.36 ± 1.63%. Both nurses and physicians reported a high rate of hand cleansing practice after exposure to patient’s body fluids and a low rate before direct patient contact (Tai et al., 2009:321). Moreover, findings from a study conducted by Darawad et al. (2012:645) to investigate Jordan's nurses' HW beliefs, attitudes, and compliance revealed a self-reported HW compliance rate of 74.25%. Sax et al.(2007:1270) and Al-Wazzan et al.
(2011:328) reported in their study, a high HH self-reported rate (90%) of nurses. Likewise, Ryan (2012:57), in her study on determinants of HH among registered nurses caring for critically ill infants in the neonatal intensive care unit, reported an overall self-reported compliance of 94.96% (SD=5.69). The findings of the current study indicate that the item with the highest reported rate of hand washing was HW after exposure to the newborn's body fluids (M=89.33%; SD=14.878), the lowest HW reported rate being after touching an object in the vicinity of the patient (73.43%; SD=22.81). This is consistent with results from other studies that also found that compliance rates were highest when participants were exposed to body fluids, M=87.83, SD=22.86 (Darawad et al., 2012:645), and M=98.94, S=7.72 (Ryan, 2012: 57).

Equally, Ryan (2012: 57) found that the lowest HH rates occurred after touching an object within the patient's vicinity (M=84.56%, SD = 15.83).

Nonetheless, the high self-reported HH compliance rates from studies that used self-administered questionnaires were not consistent with the results from observation, which showed very low HH compliance rates. Vu Binh (2007) carried out a correlational study of knowledge, attitudes and compliance of hand hygiene among healthcare workers using both observational form and self-administered questionnaire. HH compliance by self-report was high (M=85.58, SD=16.98) and more than 50% of HCWs reported that they washed their hands more than 90%. However, the compliance of HH shown by the results from the observation was not satisfactory (M= 43.76% (SD= .22). Similarly, Al-Wazzan et al., (2011:328) revealed a hand washing observed compliance rate of 33.4% among nursing staff in secondary care hospitals in Kuwait, this was controversial with the 90% reported by nurses themselves as they always washed their hands upon practicing patient care activities. Nurses consistently reported higher compliance after conducting patient care activities rather than before. Such results suggest that nurses may wash
their hands firstly to care about their own safety rather than protecting patients from HCAIs. Therefore, consciousness of patient's prevention should be raised among nurses in order to improve hand-washing compliance.

5.2 Research objective2: HW compliance and respondents' characteristics.

5.2.1 Demographic characteristics

Gender and age: descriptive statistics for the current study suggested that males reported higher HW compliance rates for themselves than females; the difference was more observed in the two age groups of more than 30 years. However, bivariate analysis using Pearson correlation did not reveal any relationship between gender and HW compliance, nor between respondents’ age and their HW compliance. This contrast with the findings from three other studies (Sax et al., 2007:1271; Snow et al., 2006:21; Tai et al., 2009:323) which indicated that females tend to clean their hands more often than males. Additionally, the results conflict with Ryan’s (2012:63) study which indicated that nurses of younger ages reported higher HH compliance rates. According to Ryan (2012:64), younger nurses in NICU might be more keenly aware of the theoretical relationships between poor HW and HCAIs. Nevertheless, these findings are consistent with studies conducted by (Snow et al., 2006:20; Quiros, Lin, & Larson, 2007:3; Sax et al., 2007:1271; Tai et al., 2009:324) who did not find any association between age and hand hygiene compliance.

Level of education: the results obtained from this study indicated that there was no difference in HW compliance among nurses who obtained a high school diploma compared with those who obtained a university degree. This is similar to the findings of Ryan (2012:65), who reported no difference in HH compliance among nurses who obtained a college diploma compared with
those who obtained a university degree. These two studies seem to suggest that a higher level of education does not necessarily lead to improved HW compliance among nurses.

**Experience and years of employment in the health facility** were not found to influence HW compliance in the current study. This is consistent with studies done previously by Quiros *et al.*, 2007; Sax *et al.*, 2007:1271; Tai *et al.*, 2009: 325, Ryan, 2012:64 which indicated that experience (years of completion of basing training) and years of employment in the health facility were not independent predictors of hand-washing compliance.

**HW promotional campaigns in the past and a formal HW training after basic professional education** were not related to self-reported compliance as shown by the findings of the current study. This conflict with the results from the study done by Sax *et al.* (2007:1271) which indicated that HCPs were more likely to practice HH if they had previous exposure to HH campaign. Furthermore, having received a structured training in HH was reported to be an independent explanatory factor of good HH adherence among nurses. Nevertheless, the findings from the current study are similar to the results reported by Tai *et al.* (2009:325) who found that neither exposure to a HH campaigns nor formal HW training after basic education did significantly predict HH compliance. Likewise, Ryan (2012:64) did not find any association between exposure to a HH campaign and HW compliance. Descriptive data of the current study showed that 64.2% of participants did not benefit from a formal HW training since they completed their basic professional education and 59.7% reported that they were not exposed to HW campaign in the past, despite that posters on HH could been seen displayed on the wall in the nursing station and at the entrance of nursery. Nurses and midwives may have not understood that HW promotion campaign could be in form of posters; this may explain why they reported to
have not been exposed to HW promotional campaign. Likewise, Jenner, Fletcher, Watson et al., 2006 in Ryan (2012:64) provided an explanation for the nurses; seemingly inaccurate responses to the question of HH campaign exposure. The authors suggested that nurses who overestimate their HH compliance may be forgetful to HH campaigns aimed at increasing their HH behaviour. Though data suggest that there was inconsistency among participants with regard to HW promotional campaign, it is unlikely that such variability existed; that may explain why the findings related to HW promotional campaign were not significant.

5.2.2 Cognitive characteristics (from the TPB)

**Attitudes:** the results from a multiple regression indicated that attitudes were independent predictor of self-reported HW compliance among participants. The same results were found by Ryan (2012:60), Darawad et al. (2012:646), Sax et al. (2007:1272), Pessoa-Silva et al. (2005), Vu Binh, (2007) and Quiros et al. (2007), who stated that nurses who reported more positive attitudes were more likely to report higher HW compliance rates. Thus, this affirms that healthcare professionals would likely comply with handwashing when they believe HW to provide more benefit.

**Intention toward HW** was found to be the strongest predictor according to self-reported HW compliance and by a multiple regression analysis. Therefore, nurses who intended to perform HW were more likely to clean their hands compared with those with lower intentions. In addition, bivariate data analysis showed that intentions toward HW were associated with other cognitive characteristics, namely attitudes, perceived behavioural control(ease to perform HW), and
subjective norm (colleagues HW compliance). This is consistent with results from other studies (Pessoa-Silva et al., 2005:308).

**Perceived behavioural control**: the bivariate data analysis in this study indicated that self-reported HW was associated with nurses' perceptions of the ease to perform HW. However, multivariate analysis revealed that perceived behavioural control has very low prediction to HW. Therefore, although nurses may perceive that it is easy to wash hands, they could not wash their hand when they intended to do so. These findings contrast with results from other research (Pessoa-Silva et al., 2005:308; Sax et al. 2007:1272; Tai et al., 2009:326; Ryan, 2012:60) in which perceived behavioural control was found to make unique significant prediction to self-reported handwashing compliance. These results may contrast with the current study due to the difference in contexts in which studies were conducted. Furthermore, research may be needed to investigate those differences.

**Subjective norms** in this study were measured by nurses' perceptions in terms of priority, on how highly HW was ranked by top management of HF; how HW was ranked by manager of service; how HW was ranked by respondents themselves; perceptions on how HW was ranked by colleagues, as well as HW compliance by colleagues. The four variables related to nurse' perceptions on how highly HW was ranked, in terms of priority did not indicate any prediction of HW from the multivariate analysis conducted. These findings are consistent with research conducted by Tai et al. (2009) and Sax et al. (2007). However, a significant association between participants' self-reported HW compliance and HW compliance of colleagues was observed from the multiple regression analysis. This finding is consistent with several studies that intended to find the relationship between cognitive determinants and HH compliance. Studies agree that
compliance rates tend to be higher if a mentor or colleague has good HH practices (Sax et al., 2007; Snow et al., 2006; Tai et al., 2009; Ryan, 2012). Therefore, nurses may likely be influenced by their colleagues' HW behavior because they work more closely and more regularly with them, as compared to the influence of the unit manager.

5.3 Conclusion

The aim of this study was to determine compliance with hand-washing among nurses and midwives caring for newborn babies in Rwamagana health facilities. Furthermore, the study sought to ascertain whether demographic characteristics, as well as cognitive characteristics (attitudes, perceived behavioural control, subjective norms and intentions) were related to the self-reported hand-washing compliance.

HW is considered to be an important measure to prevent the spread of HCAIs among neonates who represent a vulnerable population to these infections while admitted in hospital. The current study is therefore a significant contribution to assessing HW compliance rates and its predictors among nurses and midwives in Rwamagana district. The study used a descriptive quantitative design with one hundred and thirty four (134) participants composed of 65.7% of female and 34.3% of male. A self-administered questionnaire was used to collect data. Descriptive statistics were used to summarize demographic data, while bivariate analysis was carried out to determine whether there was a relationship between independent variables and HW compliance rates. Finally, a multiple regression analysis was done to determine the most unique independent predictors to HW compliance.
The results of this study indicated that the mean self-reported HW compliance among those nurses was high- 82.00%, which is consistent with previous studies on HH compliance that used self-administered questionnaire conducted with HCWs in other settings. The current study did not find any relationship between HW performance and participants' demographic characteristics. Nevertheless, the findings suggested that three of the four concepts of the framework were found to be predictors to self-reported HW compliance. Therefore, results suggest that efforts that aim to improve HW compliance among nurses and midwives working with hospitalized neonates be focused on the three concepts, which are attitudes, subjective norms and intention toward handwashing.

5.4 Recommendations

Based on the key results of this study, the following recommendations are formulated:

Although, the results show high rates of HW compliance among nurses and midwives who participated in the study, consistent efforts must be exerted in order to achieve a 100% of HH compliance, even if it is rarely achieved.

Rwamagana district management may use findings from this study to evaluate HH compliance among HCWs as well as to design appropriate interventions aiming to improve HW practices to prevent HAIs in neonates’ population. Since positive attitudes about effectiveness of HW showed a significant prediction of compliance, the researcher recommend that nurses be taught the WHO's evidence-based model for hand transmission of microorganisms during patient care (Pittet et al., 2006).
Moreover, subjective norms have been reported as predictors to HW compliance, specifically colleagues HW compliance. Thus, recognition of nurses who perform good HW, paid training to re-educate nurses on HW and support from colleagues and managers are recommended strategies for HW promotion.

The current study found that perceived behavioural control was not a predictor of HW compliance. This finding contrasted with results of previous studies. It is recommended that further research ought to be done in order to identify other factors associated with perceived behavioural control in the local context. Given that this was the first study of its kind to be done with nurses and midwives in Rwanda, and that HW compliance was measured by self-reported questionnaire, further studies using direct observation is recommended to verify the study’s findings before generalization can be done on a bigger population.

5.5 Limitations of the study

This study was conducted among nurses and midwives in health facilities of Rwamagana district, Eastern province of Rwanda. Therefore, the findings are tied to those health facilities and hence, should be considered carefully before relating them to other HCWs in the country. Secondly, the self-reported questionnaire, as highlighted in many previous studies, provided higher level of HW compliance. Nurses and midwives may have over-estimated their self-reported HW compliance rates in response to a social desire of bias. The researcher tried to minimize this limitation by using an anonymous questionnaire.
REFERENCES


Mahmood, A., FazalurRehman, Chughtai, F. 2008, 'A survey of infection control practices in the delivery room and nursery to investigate and control the high rate of neonatal sepsis: An
240.


Rwamagana hospital 2012. Annual report.


Sax, H., Uckay, I., Richet, H., Allegranzi, B., & Pittet, D. 2007, 'Determinants of good adherence to hand hygiene among healthcare workers who have extensive exposure to hand hygiene


APPENDIX I

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

27 September 2013

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by

Ms P Uwimana (School of Nursing)

Research Project: Hand washing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities, Rwanda.

Registration no: 13/8/7

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 . F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za
KIGALI HEALTH INSTITUTE
B.P. 3286 Kigali, RWANDA
Tel: +(250) 572172; +250 571788

Institutional Review Board

24th June 2013
KHI/IRB/......2013

Ms UWIMANA Philomene
Faculty of Nursing Sciences
Kigali Health Institute

Dear Ms UWIMANA Philomene

RE: ETHICS CLEARANCE

Reference is made to your application for ethics clearance for the study entitled “Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities, Rwanda”.

You will be pleased to learn that the ethics clearance has been granted to your study by the KHI Institutional Review Board (IRB) on behalf of the National Ethics Committee (NEC) in accordance with the authority granted to the IRB by the National Ethics Committee letter of 13th May 2010 and in line with the “Rwanda Ministry of Health Guidelines for Researchers Intending to do Health Research in Rwanda” of February 2012.

You shall be required to submit the progress report and any other major changes made in the proposal during the implementation stage. Also, at the end of the study the Institutional Review Board shall also require to be given a final report of the study.

I wish you success in this important study.

Prof. Kato J. NJUNWA
Chairperson, KHI Institutional Review Board

Cc:
- Rector, KHI
- Vice Rector, Academies and Research, KHI
- Chairperson, Rwanda National Ethics Committee
- Members of IRB
APPENDIX III

UWIMANA Philomène  
School of Nursing  
UNIVERSITY OF THE WESTERN CAPE  
E-mail : puwimana@khi.ac.rw  
Cell phone: +270604249318; +250788480604

Bellville, 30/09/2013

The Director of Rwamagana District Hospital
Rwamagana District, 
Eastern Province, 
RWANDA.

RE: Research Proposal – Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities, Rwanda.

Dear Sir,

I am a postgraduate student at the University of the Western Cape, Nursing Department. For the fulfillment of the requirement for master’s degree, I am planning to carry out research on the above mentioned subject.

The purpose of this study is to determine the compliance with handwashing among nurses and midwives caring newborn babies in Rwamagana Health Facilities.

It is also anticipated that the results of the study will contribute to the body of knowledge in the attitudes and practice of handwashing among nurses/midwives, as well as their compliance with handwashing guidelines in relation with the prevention of healthcare associated infections in newborn babies.

Therefore, I am writing to request for permission to conduct the study in Rwamagana Hospital and the fourteen Health Centres which fall under your supervision. A detailed outcome of the study will be presented to the Senior management of Rwamagana Hospital once the research project is complete.

Thanking you in anticipation.

Yours sincerely

Philomène UWIMANA
APPENDIX IV

REPUBLIKA YURWANDA

INTARA Y'IBURASIRAZUBA
AKARERE KA RWAMAGANA
IBITARO BYA RWAMAGANA
TEL : 0252567783
E-mail : hoprgna@gmail.com

Rwamagana, le 02/10/2013
Nº 14/.HOP/RGNA/2013

Madame UWIMANA Philomène
School of Nursing
UNIVERSITY OF THE WESTERN CAPE

Objet: Gusubiza ibarutwa yanyu

Madame,

Nkurikije ibaruwa yanyu yo kuwa 30/9/2013
mwaniditse musaba ndetse n'uruhushya (Research Ethics Committee ya UWC
na IRB/KHI) rubemerera gukora ubushakashatsi kubirebana no gukaraba intoki
kw'abaforomo n'ababyaza bita ku bana bakivuka mubitaro bya Rwamagana no
mu Bigo Nderabuzima bigize Akarere ka Rwamagana.
Mbandikiye mbamenyesha ko mwemere gukora ubwo bushakashatsi, mu
bitaro bya Rwamagana no mubigo nderabuzima.
Ibigo nderabuzima tugeneye kopi birasabwa kuzaborohereza muri icyo gikorwa.

Mugire amahoro n'akazi keza.

Dr NKURANGA John Euph.
Médecin Directeur de l'Hopital Rwamagana

BIMENYESHEJWE:
-Umuyobozi w'Ikigo Nderabuzima cyane............................................
Reference is made to your letter of 30/09/2013, requesting permission to conduct your study research entitled “Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health facilities, Rwanda”.

Considering that you fulfilled the requirements of the National Ethics Committee as shown by the ethical approval from both institutions (Research Ethics Committee from University of the Western Cape and IRB/ Kigali Health Institute), I am hereby inform you that the permission to carry out your study in Rwamagana health facilities is granted. The officials in charge of the concerned health facilities to whom a copy of this letter is given are requested to facilitate this work.

Wishing you peace and fruitful work,

Dr NKURANGA John Baptist
Medical Director of Rwamagana hospital

Cc:
- Official in charge of the health center of ......................................................
Project Title: Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health Facilities, Rwanda.

What is this study about?

I am Uwimana Philomene, a postgraduate student at the University of The Western Cape, Nursing Department. For the fulfilment of the requirement for master's degree, I am planning to carry out research on the above mentioned subject.

The purpose of this study is to determine the compliance with handwashing among nurses and midwives caring newborn babies in Rwamagana Health Facilities.

It is also anticipated that the results of the study will contribute to the body of knowledge in the attitudes and practice of handwashing among nurses/midwives with regards to the prevention of healthcare associated infections in newborn babies.

What will I be asked to do if I agree to participate?

You will be asked to answer the self-reported questionnaire that will be handed to you. Most of the questions are about your beliefs and practice of handwashing. It will take you about fifteen minutes to complete the questionnaire.

Would my participation in this study be kept confidential?
We will do our best to keep your personal information confidential. To help protect your confidentiality, we will use identification codes only on data forms. All the information will not be permissible to anyone and I will never mention your name in my records. Your name will not be mentioned anywhere and your identity will be protected to the maximum extent possible.

**What are the risks of this research?**

There are no envisaged potential risks identified.

**What are the benefits of this research?**

There may be not direct personal benefits for you, but findings from the study might be a basis for health planners at institutional level to develop appropriate and targeted interventions that would improve the hand hygiene practices to prevent neonatal deaths due infections. This study could, as well serve as baseline for further researches in this area not only in eastern province but could be extended countrywide.

**Do I have to be in this research and may I stop participating at any time?**

Your participation in this research is voluntary. There is no risk to you for not participating other than use of your time. You may decide to stop participating. If you decide not to participate in this study or if you withdraw at any time, you will not be penalized or victimized.

**What if I have questions?**

This study is being conducted by Uwimana Philomene, a student in masters in Nursing at the University of the Western Cape. If you have any questions about the research study, please contact Ms Uwimana Philomene on phone number +250 788480604 or +270604249318 at anytime or email address: 3318040@uwc.ac.za or puwimana@khi.ac.rw
Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please ask the researcher or contact:

**Dean of the Faculty of Community and Health Sciences :**

Prof. J. Frantz (Acting)

**University of the Western Cape**

Private Bag X17

Bellville 7535

021-959 2631

[jfrantz@uwc.ac.za](mailto:jfrantz@uwc.ac.za)

This research has been approved by the University of the Western Cape’s Senate Research Committee and Ethics Committee.
Titre du Projet de Recherche: Conformité au lavage des mains parmi les infirmiers(ères)/sage-femmes dispensant des soins aux nouveaux-nés dans les formations sanitaire de Rwamagana, Rwanda.

En quoi consiste cette étude?

Je m'appelle Uwimana Philomene, étudiante de troisième cycle à University of the Western Cape, Ecole des Sciences Infirmières. En vue de l'acquittement des exigences du grade de maîtrise, j'ai l'intention de mener une recherche sur la question susmentionnée.

L'objectif de cette étude est de déterminer la conformité au lavage de mains parmi les infirmiers(ères) / sages-femmes s'occupant des nouveaux-nés dans les formations sanitaire de Rwamagana.

Il est également prévu que les résultats de cette étude contribueront à enrichir les connaissances quant à l'attitude et à la pratique de lavage de mains parmi les infirmiers(ères)/sages-femmes en ce qui concerne la prévention des infections associées aux soins de santé chez les nouveaux-nés.
Qu'est-ce qui me serait demandé de faire si je suis d'accord pour participer?

Il vous sera demandé de répondre au questionnaire auto-administré qui vous sera remis. La plupart de questions sont sur vos perceptions et la pratique de lavage des mains. Il vous prendra environ quinze minutes pour remplir le questionnaire.

Est-ce que ma participation à cette étude sera gardeé confidentielle?

Nous ferons de notre mieux pour conserver vos informations personnelles confidentielles. Pour aider à protéger votre confidentialité, nous allons utiliser uniquement les codes d'identification sur les formulaires de données. Toutes les informations fournies ne seront accèder à quiconque d'autre, et je ne ferai jamais mention de votre nom dans mes dossiers. Votre nom ne sera pas mentionné nulle part et votre identité sera protégée dans la mesure du possible.

Quels sont les risques de cette étude?

Il n'y a pas des risques potentiels identifiés.

Quels sont les avantages de cette étude?

Il y a peut-être pas pour vous des avantages personnels direct, mais les résultats de l'étude pourrait être à la base, pour les planificateurs de la santé au niveau institutionnel, de la mise en place des interventions ciblées qui permettrait d'améliorer l'hygiène des mains afin de prévenir les décès néonataux dus aux infections nosocomiales. Cette étude pourrait aussi servir de référence pour d'autres recherches dans ce domaine non seulement dans la province de l'Est, mais pourrait être étendue à tout le pays.

Dois-je obligatoirement être dans cette étude et puis-je cesser de participer à tout moment?
Votre participation à cette étude est volontaire. Il n'y a pas de risque pour vous de ne pas y participer autre que l'utilisation de votre temps. Vous pouvez décider de cesser de participer. Si vous décidez de ne pas participer à cette étude ou si vous vous retirer à n'importe quel moment, vous ne serez pas pénalisé ou victimisé.

**Que se passe-t-il si j'ai des questions?**

Cette étude est entrain d'être menée par Uwimana Philomene, étudiante en maîtrise en Sciences Infirmières à University of the Western Cape). Si vous avez des questions au sujet de l'étude, veuillez contacter Mme Uwimana Philomene sur numéro de téléphone +250 788480604 ou +270604249318 à tout moment ou l'adresse e-mail : 3318040@uwc.ac.za ou puwimana@khi.ac.rw.

Si vous avez des questions concernant cette étude et vos droits en tant que participant ou si vous souhaitez signaler les problèmes que vous avez rencontrés relatifs à l'étude, veuillez demander au chercheur ou contacter:

**Dean of the Faculty of Community and Health Sciences :**

Prof. J. Frantz (Acting)

University of the Western Cape

Private Bag X17

Bellville 7535

021-959 2631

jonathan.frantz@uwc.ac.za
APPENDIX VIII

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 2271, Fax: 27 21-959 2679
E-mail: nmbombo@uwc.ac.za

INFORMED CONSENT

Title of Research Project: Handwashing compliance among nurses and midwives caring for newborn babies in Rwamagana Health facilities, Rwanda.

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant’s name…………………………
Participant’s signature……………………………….
Witness……………………………….
Date………………………

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

Professor N Mbombo
University of the Western Cape
Private Bag X17, Belville 7535
Telephone: (021)959-2271
Cell: +27 722656084
Fax: (021)959-2679
Email: nmbombo@uwc.ac.za
FORMULAIRE DE CONSENTEMENT

Titre du projet de Recherche: Conformité au lavage des mains parmis les infirmiers(ères)/sage-femmes dispensant des soins aux nouveaux-nés dans les formations sanitaire de Rwamagana, Rwanda.

L'étude m'a été décrite dans un langage que je comprends et j'accepte librement et volontairement d'y participer. Mes questions au sujet de l'étude ont été répondues. Je comprends que mon identité ne sera pas dévoilée et que je peux me retirer de l'étude sans donner de raison à tout moment et que cela n'affectera pas ma personne de quelque façon que ce soit.

Nom du participant……………………………………………………………………………………………………………………………………………………………
Signature du participant………………………………………………………………………………………………………………………………………………………
Témoin……………………………………………………………………………………………………………………………………………………………
Date…………………………………………………………………………………………………………………………………………………………

Si vous avez des questions concernant cette étude ou si vous souhaitez signaler les problèmes que vous aurez rencontrés relatifs à l'étude, veuillez communiquer avec le coordonnateur de l'étude :

Professor N Mbombo
University of the Western Cape
Private Bag X17, Belville 7535
Telephone: (021)959-2271
Cell: +27 722656084
Fax: (021)959-2679
Email: nmbombo@uwc.ac.za
APPENDIX X

50 TWILLEY GARDENS,
TWILLEY STREET,
KENILWORTH, 7708
CAPE TOWN

12 November 2013

To whom it may concern,

Hand-washing compliance among nurses and midwives caring for newborn babies at Rwamagana health facilities in Rwanda

I am an experienced editor with background in social sciences. I have thoroughly read the above dissertation by Uwimana Philomene and made the required changes to grammar, spelling, referencing, punctuation, paragraphing and formatting. This was done in line with UWCs guide to dissertations.

Adam Andani
Tel: 078 268 4761
Questionnaire on Handwashing practice among nurse/midwives

As a nurse/midwife, you are in direct contact with Newborns in maternity or nursery. For this reason, we are interested in your opinion on hand washing practice and healthcare associated infections prevention among newborns. Your answers will be kept confidential. Please do not mention your name on this questionnaire. It should take 10-15 minutes to complete the questionnaire. The completed questionnaire should be handed to the researcher or the research assistant and not to someone else.

Section A: Socio-demographic characteristics of respondents

Please, mention the appropriate answer for the following:

1. Gender: □ Female □ Male

2. Age: □ 21-30 years □ 31-40 years □ 41-50 years □ 51 years or more

3. Qualification: □ A2 □ A1 □ A0

4. Profession: □ Nurse □ Midwife

5. How many years since completion of your basic professional studies? --------------years

6. For how long have you been employed in this Health facility? --------------years

7. Have you experienced a hand washing promotional campaign in the past?
   □ No □ yes

8. If yes, how many years past? -------------

9. Have you received formal hand hygiene training after your basic education?
   □ No □ yes

10. If yes, how many years past? -------------

Section B: Perceptions of respondents on the importance of Hand washing

11. How highly ranked is hand washing by the top management of your Health facility?
   □ Top priority □ Top 2-5 priorities □ Lower than 5th priority
12. How highly ranked is hand washing by the top management of Maternity?

☐ Top priority  ☐ Top 2-5 priorities  ☐ Lower than 5th priority

13. How highly ranked is hand washing by yourself?

☐ Top priority  ☐ Top 2-5 priorities  ☐ Lower than 5th priority

14. How highly ranked is hand washing by the nursing/midwifery staff in the maternity/ nursery?

☐ Top priority  ☐ Top 2-5 priorities  ☐ Lower than 5th priority

**Section C:** In this section of the questionnaire, we are interested in your opinion on the clinical application of hand washing.

15-22. Please indicate your perception of the effectiveness of hand washing to reduce healthcare associated infections in the following situations. Please circle the appropriate answer.

<table>
<thead>
<tr>
<th>clinical situation</th>
<th>Not at all Effective</th>
<th>Extremely Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before direct contact with the newborn</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>After direct contact with a newborn</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Immediately before touching a clean site during newborn care (e.g manipulating iv apparatus)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>After exposure to the newborn's body fluids</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>After removing gloves used for newborn care</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Between touching 2 patients sequentially (e.g delivering mother and care of newborn)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>After touching an object in the vicinity of the patient ( incubator)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Between touching a newborn's groin (femoral pulse) and subsequently examining stomach contents (naso-gastric tube manipulation)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
**Section D: 23-30.** Please indicate your perception of the difficulty or ease to clean your hands in the following clinical situations by circling the appropriate answer.

<table>
<thead>
<tr>
<th>clinical situation</th>
<th>Extremely difficult</th>
<th>Extremely easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before direct contact with the newborn</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
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<tr>
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<tr>
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<td></td>
</tr>
<tr>
<td>Between touching a newborn's groin (femoral pulse) and subsequently examining stomach contents (naso-gastric tube manipulation)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

**Section E: 31-38.** Please indicate (by circling the appropriate answer) the percent of time (0-100%) you would clean your hands in ideal situation during following clinical situations.

<table>
<thead>
<tr>
<th>clinical situation</th>
<th>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before direct contact with the newborn</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>After direct contact with a newborn</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Immediately before touching a clean site during newborn care (e.g manipulating iv apparatus)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>After exposure to the newborn's body fluids</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>After removing gloves used for newborn care</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
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<tr>
<td>Between touching 2 patients sequentially (e.g delivering mother and care of newborn)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
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<tr>
<td>After touching an object in the vicinity of the patient (incubator)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Between touching a newborn's groin (femoral pulse) and subsequently examining stomach contents (naso-gastric tube manipulation)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
</tbody>
</table>
**Section F: 39-46.** Please indicate in which of the following clinical situations you actually clean your hands by circling the appropriate answer.

<table>
<thead>
<tr>
<th>Clinical Situation</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
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<tr>
<td>Before direct contact with the newborn</td>
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<tr>
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<tr>
<td>After exposure to the newborn's body fluids</td>
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<td>After removing gloves used for newborn care</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between touching 2 patients sequentially (e.g delivering mother and care of newborn)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After touching an object in the vicinity of the patient (incubator)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between touching a newborn's groin (femoral pulse) and subsequently examining stomach contents (nasogastric tube manipulation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Summary of questions**

47. In an ideal situation, at which percent of time (0-100%) would you clean your hands as recommended by handwashing guidelines? Please circle the appropriate answer.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

48. Please indicate the approximate percent (0-100%) of your handwashing compliance with handwashing guidelines. Please circle the appropriate answer.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

49. In your opinion what is the average compliance rate with handwashing guidelines of other nurses/midwives in your health facility? ----------------%

50. If we could do anything to help with the practice of hand washing, what would it be?

Thank you very much for your participation in this study.
APPENDIX XII

Questionnaire sur la pratique du lavage des mains parmi les infirmières / sages-femmes

Entant que infirmière / sage-femme, vous êtes en contact direct avec les nouveau-nés dans la salle d’accouchement ou dans le post-partum. Pour cette raison, nous sommes intéressés par votre opinion sur la pratique de lavage des mains et la prévention des infections associées aux soins de santé chez les nouveau-nés. Vos réponses resteront confidentielles. Veuillez ne pas mentionner votre nom sur ce questionnaire. Cela devrait prendre 10-15 minutes pour compléter le questionnaire. Le questionnaire rempli sera remis au chercheur ou à son assistant de recherche et pas à quelqu'un d'autre.

Section A: Caractéristiques sociodémographiques des participants

Veuillez mentionner la réponse appropriée pour ce qui suit:

1. Genre:  □ Féminin  □ Masculin


3. Qualification:  □ A2  □ A1  □ A0

4. Profession:  □ Infirmier/ère  □ Sage-femme

5. Depuis combien d’années avez-vous terminé vos études professionnelles de base? --------- ans

6. Depuis combien de temps travaillez-vous dans cet hôpital/Centre de santé? ------------- ans

7. Avez-vous bénéficié d’une campagne promotionnelle sur l’hygiène des mains dans le passé?
   □ Non  □ Oui

8. Si oui, depuis combien d'années? -----------

9. Avez-vous reçu une formation en matière d'hygiène des mains après votre éducation de base?
   □ Non  □ Oui

10. Si oui, depuis combien d'années ? ---------
Section B: Perceptions des répondants sur l'importance de l'hygiène des mains

11. Selon vous, comment les responsables d'hôpital/Centre de santé classent l'hygiène de mains en termes de priorité?
   - [ ] Grande priorité
   - [ ] Dans les 2-5 priorités
   - [ ] Moins prioritaire (5ème)

12. Selon vous, comment votre responsable de service classe l’hygiène de mains en termes de priorité?
   - [ ] Grande priorité
   - [ ] Dans les 2-5 priorités
   - [ ] Moins prioritaire (5ème)

13. Comment classez-vous l’hygiène de mains en termes de priorité?
   - [ ] Grande priorité
   - [ ] Dans les 2-5 priorités
   - [ ] Moins prioritaire (5ème)

14. Selon vous, comment vos collègues de service classent-ils l’hygiène de mains en termes de priorité?
   - [ ] Grande priorité
   - [ ] Dans les 2-5 priorités
   - [ ] Moins prioritaire (5ème)

Section C: Dans cette section du questionnaire, nous sommes intéressés par votre opinion sur de lavage des mains dans les situations cliniques suivantes :


<table>
<thead>
<tr>
<th>Situation clinique</th>
<th>Pas du tout efficace</th>
<th>Extremêmement efficace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avant le contact direct avec le nouveau-né</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Après contact direct avec un nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immédiatement avant de toucher site propre pendant les soins néonatals (par exemple la manipulation iv aparatus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après contact avec des secrétions corporelles du nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir enlevé les gants utilisés pour les soins du nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entre deux soins consécutifs de 2 patients (par exemple, accouchement et soins du nouveau-né)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir touché sur un équipement de soins à proximité du patient (Couveuse)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir touché l'aine du nouveau-né (pouls fémoral) et avant d'examener le contenu gastrique (manipulation d'une sonde naso-gastrique)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Section D: 23 - 30.** S'il vous plaît indiquer votre perception de la difficulté ou la facilité à laver vos mains dans les situations cliniques suivantes en encerclant la réponse appropriée.

<table>
<thead>
<tr>
<th>Situation clinique</th>
<th>Extrêmement difficile</th>
<th>Très facile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avant le contact direct avec le nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après contact direct avec un nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immédiatement avant de toucher site propre pendant les soins néonatals (par exemple la manipulation iv aparatus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après contact avec des sécrétions corporelles du nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir enlevé les gants utilisés pour les soins du nouveau-né</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entre deux soins consécutifs de 2 patients (par exemple, accouchement et soins du nouveau-né)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir touché sur un équipement de soins à proximité du patient (Couveuse)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Après avoir touché l'aïne du nouveau-né (pouls fémoral) et avant d'examiner le contenu gastrique (manipulation d'une sonde naso-gastrique)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Section E: 31 - 38.** Dans les situations idéales, à quel pourcentage du temps (0-100%) vous laveriez-vous les mains dans les situations cliniques suivantes en encerclant la réponse appropriée:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Réponses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avant le contact direct avec le nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après contact direct avec un nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Immédiatement avant de toucher site propre pendant les soins néonatals (par exemple la manipulation iv aparatus)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après contact avec des sécrétions corporelles du nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir enlevé les gants utilisés pour les soins du nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Entre deux soins consécutifs de 2 patients (par exemple, accouchement et soins du nouveau-né)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir touché sur un équipement de soins à proximité du patient (Couveuse)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir touché l’aine du nouveau-né (pouls fémoral) et avant d’examiner le contenu gastrique (manipulation d’une sonde naso-gastrique)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
</tbody>
</table>

**Section F: 39- 46.** Réellement, à quel pourcentage du temps (0-100%) vous lavez-vous les mains dans les situations cliniques suivantes en encerclant la réponse appropriée:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Réponses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avant le contact direct avec le nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après contact direct avec un nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Immédiatement avant de toucher site propre pendant les soins néonatals (par exemple la manipulation iv aparatus)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après contact avec des sécrétions corporelles du nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir enlevé les gants utilisés pour les soins du nouveau-né</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Entre deux soins consécutifs de 2 patients (par exemple, accouchement et soins du nouveau-né)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir touché sur un équipement de soins à proximité du patient (Couveuse)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Après avoir touché l’aine du nouveau-né (pouls fémoral) et avant d’examiner le contenu gastrique (manipulation d’une sonde naso-gastrique)</td>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
</tbody>
</table>
Questions récapitulatives

47. Dans les situations idéales, à quel pourcentage du temps (0-100%) vous laveriez-vous les mains comme recommandé par les directives de l’hygiène des mains? Veuillez encercler la réponse appropriée.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

48. Veuillez indiquer le pourcentage approximatif (0-100%) de votre conformité aux directives de lavage des mains, en encerclant la réponse appropriée.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

49. A votre avis, quel est le taux moyen de conformité aux directives du lavage des mains des autres infirmières / sages-femmes de votre hôpital/Centre de santé? ----------------%

50. Si nous pouvions faire quelque chose pour contribuer à l’amélioration de l’hygiène des mains, quelle serait notre contribution?

Merci beaucoup pour votre participation à cette étude.
Request for permission to use study tool

Uwimana, Philomène <puwimana@khi.ac.rw>  
from: Uwimana, Philomène <puwimana@khi.ac.rw>  
to: taiwm@ha.org.hk  
date: 10 April 2013 13:26  
subject: Request for permission to use study tool  
mailed-by: khi.ac.rw  
to taiwm

Good afternoon Professor Tai,

I am Philomene Uwimana, a MSc candidate in Nursing at the University of the Western Cape, Cape Town, South Africa. In order to complete the program, I would like to replicate your study among nurses and midwives in a district hospital in the eastern province of Rwanda, for my thesis.

Therefore, I would like to request you a permission to use the questionnaire used in your study entitled "Nurses and Physicians’ Perceptions of the Importance and Impact of Healthcare-Associated Infections and Hand Hygiene: a Multi-Center Exploratory Study in Hong Kong. Published in 2009, in Infection, 37(4): 320-333.

I fully intend to acknowledge yourself and you colleagues for the questionnaire.

Thank you for your consideration
Josepha TAI
from: Josepha TAI <taiwm@ha.org.hk>
to: "Uwimana, Philomène" <puwimana@khi.ac.rw>
date: 10 April 2013 15:35
subject: RE: Request for permission to use study tool mailed-by: ha.org.hk

to me

Dear Philomène Uwimana,

Please feel free to use the study tool and thanks for your interest!

Best Regards,

Josepha

護理前後要潔手
愛人愛己要遵守
Appendix

Questionnaire on hand hygiene and nosocomial infections for healthcare workers

You are in direct contact with patients on a daily basis; this is why we are very interested in your opinion on healthcare-associated infections (HCAIs) and hand hygiene. Your answers will be kept confidential. It should take you about 15 minutes to fill in this questionnaire. Please read the questions carefully, and then respond spontaneously.

Section A

A1. Gender:  ○ female  ○ male
A3. Years since completion of basic professional training: _______ years
A4. Years in present institution: _______ years
A5. Profession:  ○ nurse  ○ physician  ○ health care assistant  ○ others: _______
A6. Department:  ○ medicine  ○ surgery  ○ intensive care unit  ○ other (specify): _______
A7. Have you experienced a hand hygiene promotional campaign in the past?  ○ no  ○ yes: year ______
A8. Did you receive a formal education in hand hygiene after your basic training?  ○ no  ○ yes: year ______

Section B

In this session of the questionnaire, we are interested in your perception of the importance and impact of HCAIs in your country.

In your opinion:
B1. On average, what percentage (between 0 and 100%) of hospitalized patients will suffer from an HCAI? _______ %
B2. On average, what percentage (between 0 and 100%) of patients with an HCAI will die due to the infection? _______ %
B3. On average, how many additional days will patients with an HCAI have to stay in hospital because of their infection? _______
B4. On average, how much does an HCAI cost in HK dollars? _______

Section C

In this section, we are interested in your perception of the importance of hand hygiene.

In your opinion:
C1. What percentage of HCAIs can be prevented by optimal hand hygiene practices: _______ %
C2. On average, how many times per hour do you (ideally) have to cleanse your hands during your patient care activity? _______
C3. What is the average compliance (between 0 and 100%) of healthcare workers with hand hygiene recommendations at your institution (in general)? _______ %
C4. How highly ranked is the issue of hand hygiene among all patient safety issues by the top management of your institution?  ○ top priority  ○ among 2-5 top priorities  ○ lower than 5th priority
C5. How highly ranked is the issue of hand hygiene among all patient safety issues by the top management of your department?  ○ top priority  ○ among 2-5 top priorities  ○ lower than 5th priority
C6. How highly ranked is the issue of hand hygiene among all patient safety issues by yourself?  ○ top priority  ○ among 2-5 top priorities  ○ lower than 5th priority
Section D

Healthcare workers do not usually cleanse their hands often enough during patient care.
We are interested in your judgment of the effectiveness of the following interventions to increase compliance with hand hygiene guidelines in a healthcare institution.

D1. The head of your department regularly includes this topic in his/her main messages to staff.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D2. Your preferred superior performs hand hygiene each time this is required (being a perfect example).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D3. The healthcare facility makes alcohol-based handrub easily available at each point of patient care.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D4. Hand hygiene posters are displayed in patient care areas of the healthcare facility as reminders.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D5. Each healthcare worker receives basic training in hand hygiene.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D6. Clear, easily understandable hand hygiene guidelines are easily accessible for every healthcare worker.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D7. Healthcare workers receive regular feedback on their compliance with recommended hand hygiene practices (results of direct observations).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D8. Revision of common patient care protocols to reduce the frequency of mandatory indications for hand hygiene.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D9. You perform hand hygiene each time this is required (being a perfect example).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D10. Patients are educated about the importance of hand hygiene during care by healthcare workers and remind them to perform it.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
D11. A promotional campaign for hand hygiene featuring most of the elements mentioned above (D1-D10).
   Not all effective O-----------------------------O-----------------------------O Extremely effective

Section E

In this section of the questionnaire, we are interested in your opinion of the clinical application of hand hygiene.
A. Please indicate your perception of the effectiveness of cleaning your hands to reduce HCAIs in the following clinical situations (by filling in a "O") on the visual scale.

Ea1. Before direct contact with a patient (e.g. helping him/her into bed).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea2. After direct contact with a patient (e.g. after having examined his/her elbow).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea3. Immediately before touching a clean site during patient care (e.g. opening an IV catheter hub).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea4. After exposure to a patient's body fluids (e.g. respiratory secretions).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea5. After removing gloves used for patient care.
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea6. After touching an object in the immediate vicinity of a patient (e.g. touching the bed).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea7. Between touching two patients sequentially (e.g. measuring the blood pressure of pt. A, then of pt. B).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
Ea8. Between touching a patient's groin (femoral pulse) and subsequently examining his/her eye (e.g. to look for uveitis).
   Not all effective O-----------------------------O-----------------------------O Extremely effective
B. Please indicate your perception of the difficulty or ease to cleanse your hands in the following clinical situations (by filling in a "O") on the visual scale.

Eb1. Before direct contact with a patient (e.g. helping him/her into bed).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb2. After direct contact with a patient (e.g. after having examined his/her elbow).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb3. Immediately before touching a clean site during patient care (e.g. opening an IV catheter hub).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb4. After exposure to a patient’s body fluids (e.g. respiratory secretions).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb5. After removing gloves used for patient care.
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb6. After touching an object in the immediate vicinity of a patient (e.g. touching the bed).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb7. Between touching two patients sequentially (e.g. measuring the blood pressure of patient A, then of patient B).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

Eb8. Between touching a patient’s groin (femoral pulse) and subsequently examining his/her eye (e.g. to look for anaemia).
   Extremely difficult O--------O--------O--------O--------O--------O--------O--------O--------O--------Extremely easy

C. Please indicate your perception of how much your superiors want you to cleanse your hands in the following clinical situations (by filling in a "O") on the visual scale.

Ec1. Before direct contact with a patient (e.g. helping him/her into bed).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec2. After direct contact with a patient (e.g. after having examined his/her elbow).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec3. Immediately before touching a clean site during patient care (e.g. opening an IV catheter hub).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec4. After exposure to a patient’s body fluids (e.g. respiratory secretions).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec5. After removing gloves used for patient care.
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec6. After touching an object in the immediate vicinity of a patient (e.g. touching the bed).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec7. Between touching two patients sequentially (e.g. measuring the blood pressure of patient A, then of patient B).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it

Ec8. Between touching a patient’s groin (femoral pulse) and subsequently examining his/her eye (e.g. to look for anaemia).
   Do not care at all O--------O--------O--------O--------O--------O--------O--------O--------O--------Want me to do it
Please indicate in which of the following clinical situations you actually cleanse your hands (by filling in a “○”) on the following visual scale.

Ed1. Before direct contact with a patient (e.g. helping him/her into bed).

Ed2. After direct contact with a patient (e.g. after having examined his/her elbow).

Ed3. Immediately before touching a clean site during patient care (e.g. opening an IV catheter hub).

Ed4. After exposure to a patient’s body fluids (e.g. respiratory secretions).

Ed5. After removing gloves used for patient care.

Ed6. After touching an object in the immediate vicinity of a patient (e.g. touching the bed).

Ed7. Between touching two patients sequentially (e.g. measuring the blood pressure of patient A, then of patient B).

Ed8. Between touching a patient’s groin (temporal pulse) and subsequently examining his/her eye (e.g. to look for anemia).

And some summary questions:

E9. Please indicate on the visual scale your perception of the effectiveness of cleansing your hands to reduce HCAIs:

E10. Please indicate your perception of the ease or difficulty of actually cleansing your hands during your clinical work with patients:

E11. Please indicate your perception of how much your supervisors want you to cleanse your hands during your clinical work with patients:

E12. Please indicate the number of times (0-100%) you actually cleanse your hands when required:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%