Swift Journals

Swift Journal of Nursing and Midwifery
Vol 2(1) pp. 007-017 February, 2016.
http://www.swiftjournals.org/sjnm

Original Research Article

Assessing the Hand Washing Practices of Nursing Staff of the Intensive Care Units at Selected Hospitals Based on the Infection Control Policy for Hand Washing of Trinidad and Tobago Health Department.

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Accepted 15th February, 2016.

ABSTRACT

Background: Hand washing has become one of the most recommended methods of infection control in hospitals. Studies indicate that the knowledge, attitude and practices are poor in many countries. There has not been any study of similar in the Trinidad and Tobago. This study is an attempt to document the situation in the twin-Island state. Aim: To document the perceptions of the nurses in the Intensive Care Units (ICUs) of the selected hospitals in Trinidad with regard to hand washing in accordance with the policies of the Ministry Health, Trinidad and Tobago. Methods: A cross-sectional survey was conducted using 3 major hospitals with ICUs. 81% of the nurses in the units voluntarily participated. Result was analyzed in simple percentage frequencies and presented in tables. Result: Overall the nurses show favourable perceptions on aspects of the policy. There are however aspects of the perceptions that indicate that are suspect. Discussion: The result was discussed noting the implications of their perceptions compared to literature.

Keywords: Nurses, Hand washing, infection control, Caribbean.

BACKGROUND

The history of hand washing and its role in infection prevention and control began with Florence Nightingale; she was a champion for the cause even though she had no scientific understanding of asepsis. Her belief in purity of water and air as well as efficient drainage, light and cleanliness lead to her research in hospital sanitary problems. This research helped to establish a standard of formalized cleanliness and sanitation in hospitals (Ellis, 2015). Ignaz Semmelweis, another pioneer observed that the maternal death rate at the hospital had increased fivefold for mothers who were being delivered by medical students and opined in May 15th, 1847, that disinfecting hands or routine hand washing could prevent the transmission of infection to patients. This resulted in a decrease in maternal death (Ellis, 2015).

In the USA Weinstein and Bonten (2002) indicated that Intensive care units (ICU) are a primary component of modern medicine and accounting for more than 95% of admissions although the ICUs account for only about 5% of the hospital beds. They further indicated that more than a third of these cases develop complications and these complications are mostly nosocomial. Ducel (2001) noted that the most frequent nosocomial infections are infections of surgical wounds, urinary tract infections and lower respiratory tract infections. Studies conducted by the World Health Organization (WHO) and other health agencies, have shown that the highest prevalence of nosocomial infections occur in intensive care units and in acute surgical and orthopaedic wards. Infection rates are higher among patients with increased susceptibility because of old age, underlying disease, or chemotherapy.

Nosocomial infections have become one of the most significant causes of morbidity and mortality in health care institutions, which have led to the development of policies for hand washing. Half of all life threatening nosocomial infections have occurred in intensive care units (ICU). Consequently, infection prevention and control policies were implemented in all ICU's to curb this occurrence (Bearman & Munro, 2006). According to the Centers for Disease Control and Prevention (2009), the results of patient's severity of illness related to

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exposure to life-saving invasive devices and procedures have increased. Numerous studies have reported high rates of infection in ICU patients, accounting for >20% of nosocomial infections, with increased morbidity and financial cost and the mortality exceeding 40%. The epidemiology of nosocomial infections in ICU's has been extensively studied (Weinstein & Bonten, 2002). Major sites of infection, associated pathogens and rates vary considerably within hospitals by types of ICU, reflecting differences in the hosts' underlying conditions; types and frequency of invasive devices, patterns of antibiotic use, and the selection pressure, and the unique ICU environment (Weinstein & Bonten, 2002).

These observations suggested that each type of ICU might require different control measures. ICU-acquired infections are the result of a complex interaction of several factors, including host defense mechanisms and underlying conditions, medical devices, infectious agents and antimicrobial resistance, sources of colonization, and cross-infection. However, hand carriage has remained the main vehicle of transmission (Weinstein & Bonten, 2002). According to a study in the February issue of the American Journal of Infection Control (2014), intensive care units have shown uneven compliance with hand washing policies. Columbia University collaborated with the Centers for Disease Control and Prevention and carried out one of the largest studies of its kind. They performed a nationwide survey of 1,534 ICU's at 975 hospitals as part of a study in prevention of nosocomial infections (Stone, 2014).

The survey collected information on the implementation of 16 prescribed infection prevention measures at point-of-care and clinician and nursing staff adherence to these policies for the prevention of central line-associated bloodstream infections (CLABSI), ventilator-associated pneumonia (VAP), and catheter-associated urinary tract infections (CAUTI). These infections are among the most common infections acquired by patients in ICUs (Stone, 2014). The results of this survey showed that prevention measures such as hand washing were not well implemented especially in practices related to CAUTI. According to the survey, many hospital ICU's fell short in adhering to policies (Stone, 2014).

The Importance of Hand Washing

The most crucial intervention involved in breaking this chain, is hand hygiene. Hand hygiene as a method of infection control is not only cost effective, but it is also fast and virtually effortless (Bjerke, 2004). As coined by Bjerke (2004), the objective of hand hygiene is to suspend and remove soil, debris, bio burden, and transient microorganisms; to inhibit, kill and remove transient and resident skin flora; and to inhibit re-growth of microbes. It incorporates the methods of hand cleansing, hand washing, hand disinfecting with antimicrobials, alcohol based hand sanitizers and surgical hand scrub. Hand hygiene is internationally recognized as a cost effective measure in the prevention of HCAI's (World Health Organization, 2012; Hardy, 2012)

In 1847, a Hungarian Physician named Ignaz Phillip Semmelweis, through his research recognized that hospital-acquired diseases were transmitted via the hands of health care workers (Hardy, 2012, Towmey, 2006). In 2012, a study was conducted in a Brazilian hospital with the aim of increasing compliance with hand hygiene and its relation to nosocomial infection, MRSA infections and colonization rates. Hand hygiene compliance was evaluated through direct observation and measured by the occurrence of HCAI, inclusive of MRSA. The results of this study indicated that overall compliance with hand hygiene did not increase. However, Hand washing before and after contact with patient's improved from 40 to 76% for health care workers and the rates of nosocomial infections and MRSA remained at a high, but stable rate (Borges, Ferreira, Alves, Rocha Jose, Gontijo, Paulo, &Pinto 2012).

In 2002 the CDC, (as cited in Carita, Schub, & Pravikoff, 2014) developed guidelines for hand hygiene in healthcare settings; these guidelines recommended the use of alcohol based sanitizers in clinical settings for hands that are not visibly soiled. (Carita, Schub, & Pravikoff, 2014) The intensive care nurse is in constant contact with the patient and as such has a vitally important responsibility in preventing hospital care associated infections (HCAI's). These nurses should have current knowledge regarding infection prevention and control and universal precautions that are accepted worldwide and this knowledge must be reinforced through practice while providing the most effective patient care (Yüceer & Demir, 2009).

Additionally, as patient advocates, it has always been the duty of the intensive care nurse to ensure that all members of the health care team are compliant with the guidelines of the infection control policies and procedures so as to protect the patient from HCAI's (Yüceer & Demir, 2009). Ensuring compliance with these evidenced-based recommendations during daily nursing practice has proven to be quite problematic. In a study conducted by Vandijck, Labeau, Vogelaers, & Blot (2010), it was discovered that nurses' compliance, knowledge, attitude and perception of evidence-based guidelines in the prevention of infection were relatively poor (Vandijcket al., 2010).

On average, the scores for nurses' knowledge on the prevention of surgical site infection were outrageously low at 29.0%. Even more disturbing, the project showed that less than half of the respondents, 45.7%, knew the CDC guidelines for the protection of surgical wounds during the first 24-48 hours post-surgery (Vandijck et al., 2010), and most most patients in the intensive care unit are admitted because of a life threatening medical or surgical condition (Munro, Giuliano, &Kleinpell, 2008). Open lines of communication and compliance to infection control policies was identified as pivotal in the control of HCAI's. The ICU nurse as patient advocate has assumed full responsibility for the delivery of quality care that is evidenced based.

Consequently, the nurse fosters an atmosphere of open communication between all members of the multidisciplinary team, pursuant of enforcing infection control measures and monitoring, reducing and ultimately eliminating the dilemma of HCAI's (Stone, Pogorzelska-Maziarz, Herzig, Weiner, Furuya, Dick, & Larson, 2014).

Problem Statement

Infection prevention and control policies for hand washing, seek to prevent the spread of health care-associated infections in a health care facility. The policies and guidelines, which are made to prevent infections, are required to monitor and control infections in health care facilities (Ministry of Health, 2011). Therefore, it is of great importance that health care workers comply with these policies and guidelines to minimize the spread of infections in health care facilities. Registered Nurses (RN's) and Critical Care Nurses (CCN's) are in constant contact with critically ill patients who are completely dependent on them to provide health care and to meet their activities of daily living. Two foundational tenets of nursing are non-maleficence and advocacy. As such, nurses are charged with the prime responsibility of ensuring that they are equipped with knowledge about infection control policies and procedures.

Documented studies from other developed countries have shown that the knowledge and practice of hand washing policies by ICU nurses was not up to recommended standards. However, there are no documented studies of this problem in Trinidad and Tobago.

Additionally, statistics from the World Health Organization (WHO) has shown that as many as two-thirds of the patients admitted to an intensive care unit in Trinidad and Tobago would have suffered from at least one health care-associated infection (WHO, 2015). It was a unanimous decision by the members of this research team that such a study should be conducted in Trinidad and Tobago, as the members have witnessed poor hand hygiene practices by their nursing and medical colleagues within the ICU and other wards of our public health care facilities. This has led to questions concerning the knowledge and practice of nursing staff with regards to hand washing policies in the Intensive Care Unit.

Research Objectives: The objective of this study is to determine if the hand washing practices of the nursing staff at the ICU departments of the selected hospitals in Trinidad and Tobago comply with the stipulated guidelines from the Ministry of Health, Trinidad and Tobago.

Research Question: The study sets out to answer the question, does the nursing staff's practice of hand washing complies with the guidelines outlined in the policy and procedure for hand washing?

The Significance of the Study: Infection control programmes are proven to be effective In hospitals Collins, (2006) as cited in Dixon, 2011.The evolving responsibility for operating and maintaining a facility-wide effective infection control program lies within many domains (Collins, 2006). Essential components of effective hand washing programs included conducting organized surveillance and control activities, a trained infection-control physician, an infection control nurse for every 250 beds and a process for feedback of infection rates to clinical care staff. These programmatic components have remained consistent over time and were adopted in the infection control standards of the Joint Commission (formerly the Joint Commission on Accreditation of Healthcare Organizations, JCAHO) (Collins, 2006).

Collins (2006) has stated both hospital administrators and health care workers are tasked to demonstrate the following:

1. Effectiveness of hand washing programs
2. Assure adequate staff training in hand washing techniques
3. Assure that surveillance results are linked to performance measurement improvements
4. Evaluate changing priorities based on ongoing risk assessments
5. Ensure adequate numbers of competent infection control practitioners
6. Perform program evaluations using quality improvement tools as indicated It is envisaged that this study will provide the status of the practice of the nurses with regard to hand washing. It will also provide the needed data as well as suggest areas of strengthening with a view to minimizing HCAI in hospitals of Trinidad and Tobago.

Adaptation of the Precede – Proceed Model as the Framework.

Noncompliance to infection prevention and control policies such as the hand washing procedure by health care workers in an intensive care unit has been well documented. These studies have evaluated that there are factors which influence health care workers decision to comply with infection prevention and control policies for hand washing. Stathopoulou and Skourti (2010) provided the following components; predisposing, reinforcing and enabling factors, according to the Precede – Proceed model.

Predisposing Factors

All nursing personnel are aware that patients are a potential reservoir for infectious agents. It has been observed that many nurses view hand washing and hand hygiene as a habit and they perform the procedure without even thinking about it. However, there exist a number of factors which influence the importance they place on performing the hand washing procedure. These include: the general condition of the patient; exposure to blood and body fluids and the procedure performed (Whitby et al., 2006).

The extent of patient contact has also affected nurses' decisions to wash their hands. Tasks which involved minimal contact with the patient, such as measuring heart rate and blood pressure as well as administering medication, clean linen or touching patient clothing were not considered motivating factors for hand washing (Whitby et al., 2006). Nurses compared these tasks to those which involve intimate contact with patients and dirtiness of the actual task. Such as visible body fluids and contact with axillae, genitals or groin, as well as procedures such as suctioning and dressing of wounds. These activities compelled nursing staff to wash their hands (Whitby et al., 2006).

The workload was another predisposing factor reported by nurses, whereby task assignment and time constraints are used to determine the importance of hand washing. In situations such as these, nurses would prefer to sanitize their hands with an alcohol-based sanitizer, providing that the task was not considered dirty (Whitby et al., 2006).

Enabling Factors

One factor, which enables nurses to comply with hand washing policies, includes availability and accessibility of the resources to perform the hand washing procedure. The Port of Spain General Hospital is a nine- bedded ICU with one isolation room, which has its own sink; the other eight beds are in an open unit with four sinks, giving a ratio of beds to sinks as 2:1. There are also six wall mounted automatic hand sanitizers placed within the open unit and one in the isolation room. At the Sangre Grande Hospital ICU unit there is a 1:1 sink ratio as each of the three beds in the unit has its own sink. In addition, there are 12 wall mounted automatic hand sanitizers one at each bed and the others, strategically placed at various entrances and exists in the unit.

The Eric Williams Medical Sciences Complex (EWMSC) ICU is a five (5) bedded unit, which has a 5:2 sink ratio. These sinks are controlled with the foot and thus avoiding touching of the tap handles. The unit also has three automated hand sanitizers. This availability of sinks for nursing staff is a great motivator for hand washing as it allows them to perform the task as frequently as they need to. This is supported by a study, which was conducted by a graduate student in a medical, and surgical ICU at a university affiliated hospital in Chicago. The frequency of hand washing was compared in both ICU's and the results showed that the nurses in the medical ICU which has a 1:1 ratio of beds to sinks has a higher percentage of hand washes 76%, than those in the surgical ICU which has a 4:1 ratio of beds to sink whose percentage was 51% (Zellmer, Blakney, Van Hoof, & Safdar, 2015).

Reinforcing Factors

One major reinforcing factor, which encourages nursing staff to adhere to infection prevention and control policies, is the presence of an infection control nurse (Wagner, 2013). Infection control nurses are invaluable in educating staff about ways to prevent the spread of infectious agents. They also track and reduce the number of infectious diseases in a hospital and orchestrate the care of high risk patients (Wagner, 2013). At all three hospitals the infection control nurses visit twice a week to educate staff and to motivate them to adhere to all infection prevention and control policies. They are excellent teachers, as well as role models who are in contact with patients and other nursing staff to ensure that the hospital and its acute care area is a safe place for both staff and patients.

METHODOLOGY

Research Design

A non-experimental, descriptive, cross-sectional survey was the research design used in this study since we looked variables without manipulating them (Dengler, 2011; Bevins, 1999, and Nebecker, 2013). Therefore, this study sought to determine the hand washing practices of the intensive care nurses at 3 major teaching hospitals in Trinidad based on the policies related to hand washing of the Ministry of Health, Trinidad and Tobago.

Sample Size

The study population consisted of eighty-four (84) nursing personnel. In Hospital A, there were thirty (30) Registered Nurses (RNs) as well as (four) 4 Enrolled Nursing Assistants (ENA). Out of the Registered Nurses, eight were Critical Care Nurses (CCN). In Hospital B, there were twenty-three (23) Registered Nurses (RN) of which seventeen (17) were CCNs. and six (6) were RNs. The unit also has (six) 6ENAs. Hospital C, also has twenty-three (23) RNs, of which, nine (9) were CCNs and fourteen (14) were RNs. and two ENAs. We believe that the nurses in these ICUs of the 3 hospitals represented the largest group of ICU nurses throughout Trinidad.
All nursing personnel that were present during the 7am-3pm and 1pm-9pm shifts were invited to participate in the study and be part of the sample population.

Instruments of Data Collection

A non-participant observational checklist was used to gather information on the nursing staff behaviour and practice of the hand washing procedure. The checklist was an adaptation of the World Health Organization Guidelines on Hand Hygiene in Health Care as well as from information gathered at the Port of Spain General Hospital's (POSGH's) Policies and Procedures Manual for Hand Hygiene. The checklist was used to observe nursing staff as they carried out their duties and during the actual hand washing procedure. The checklist contained 31 items which were divided into three sections; indications for hand washing and hand asepsis, hand washing procedure with alcohol-based hand sanitizers and hand washing procedure with soap and water. Items on the list were ticked off as they were performed, the data collected allowed the researchers to compare the nurses' hand washing with the hand washing procedure set out. This method of data collection helped to determine if the Infection Prevention and Control Policies for hand washing was actually being followed by nursing staff. The checklist also had a section with 9 items pertaining to the demographics of the nurses.

Reliability & Validity

This instrument was constructed as an adaptation of the set standard from WHO and the stipulations as indicated by the Local Hospital based in Port of Spain, Trinidad . Further, the checklist was submitted to the Senior Infection Prevention and Control Officer at the Infection and Control Department in the selected hospitals for further validation. These ensured content-validity. Also the research participants were "blinded" to the periods of observation, as the researchers were nursing staff of the units being observed, In this way, participant bias, exposure-suspicion bias, and inter-observer reliability issues were deemed to have been avoided considerably. In all we deemed the instrument to have acceptable validity and reliability to execute the study (Golafshani, 2003, Chan 2007-11)

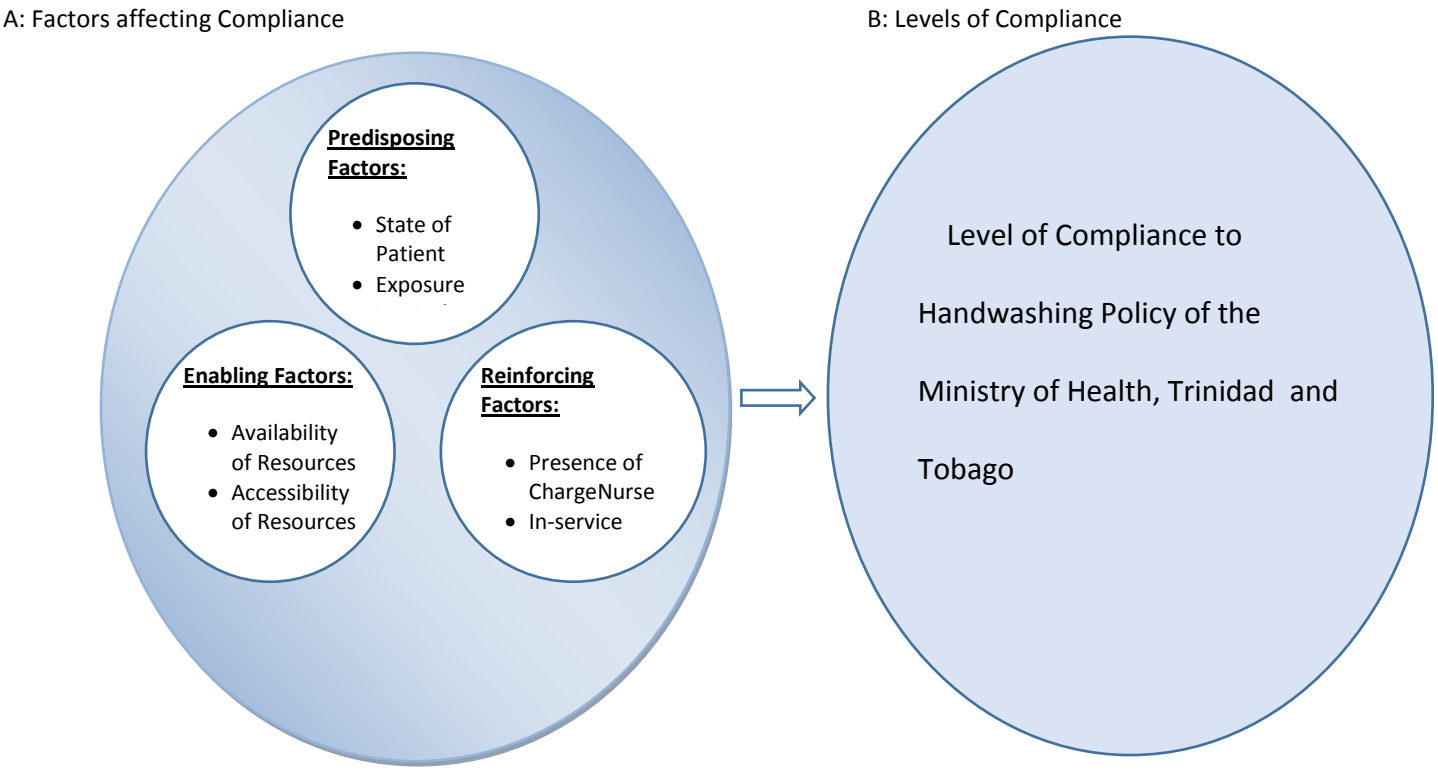
Data Collection Procedure

Data was collected over a period of one month and began when all required ethical approvals were obtained from (a) The Ethics Committee of the University of the West Indies and (b) the ethics committees of the three respective Regional Health Authorities. A letter was also sent to the Hospital Administrator of the selected hospitals for their permissions to conduct the study at the ICU. Data collection took place during the 7am-3pm and 1pm-9pm shifts over the specified period. The team explained the purpose of the study and answered questions by nursing staff before consent was obtained. The observations began after consent was signed but the nursing staff were not made aware of the actual times and periods of the observation. Each member of staff was observed at least 3 times at 3 different days and times.

Instrument For Data Analysis

The items on the checklist (instrument) were rated from "Poor" to "Excellent", depending on the level of performance according to the guidelines. Each staff member was observed 4 times, and the average performance was calculated for each of the items. Thus the number of times each staff was rated Poor, Fair, Average, Good, and Excellent was totalled and presented as absolute percentages.

Figure 1: The Precede-Proceed Model for level of Compliance to Hand washing Policy



The interaction among the factors in A ultimately affects the level of compliance in B to the stipulations of the Ministry of Health, Trinidad and Tobago.

RESULT

Demographics

Table 1summarizes the percentage of participants who answered the questionnaires given by the research team. The first 9 items in the questionnaire addressed the demographic data of the participants. Of the entire population, 83% were females and 17% were males. Fifty-five percent (55%) of the population was aged between 31-40 years old, whereas 16% were aged between 20- 30 years old. The religious background of the participants ranged from 54% of unknown religion, 31% Christians, 12% Hindus and 3% Muslims. The Ethnicity of the participants comprised of 58% African descent, 19% East Indian descent, 14% other and 9% mixed. Forty-four (44%) of the nursing staff were critical care nurses, 33% were registered nurses and 23% were Enrolled Nursing Assistant(ENA). 50% of the staff worked in the ICU for 2-5 years, whereas 3% of the staff worked in the unit for less than 6 months.

The highest level of qualification in the population was Masters of Science in Nursing. Five percent (5%) of the population had this qualification. Thirty-six percent (36 %) were registered nurses and 27% were post basic registered nurses. The work experience of the population ranged from 52% with 0-10 years' experience and 26% with 11-20 years of experience. Those with 21-30 and 31-40 years of experience were represented by 6% each. The majority of the population received their training from either the Ministry of Health School of Nursing or the College of Sciences Tertiary Appling Art of Trinidad and Tobago both of which represented 34% of the population.

Indication for Hand Washing

Table 4 represents the total percentage of participants who were observed during the 7-3 and 1-9 shifts. The first 9 items of the checklist were used to observe if the indications for hand washing were implemented by nursing staff according to the hand washing policy. Of the study population observed, the majority 34% and 36% were rated as good and excellent respectively in washing hands visibly dirty or contaminated. An even higher percent, 38% and 39% did so when their hands were visibly soiled with body fluids or blood. Hand washing before direct patient contact was done fairly by 44% of participants and poorly by 23%. When compared with hand washing after direct patient contact 47% did so fairly, and only 9% performed this task poorly.

During the study period, 48% of those observed received an average score for washing their hands after glove removal while 19% performed this task poorly. When it came to invasive devices, regardless of glove use, 41% received an average score and a very small amount, 2% did this excellently. After contact with non-intact skin or wound dressing 36% received a good score while 3% performed this poorly. When moving from a contaminated body site to a clean body site, 34% of participants received an average score for this task. Nine percent (9%) of participants performed this task poorly while 9% performed excellently. Before handling medication or preparing food 54% of participants received average scores, whereas 8% washed their hands poorly. In total, 48% of the participants received good scores overall for knowing the indications for hand washing whereas only 5% received excellent scores and 0% received poor scores.

Table 1: Demographics

Gender	**Male**	**Female**
	17%	83%

Age	**20-30**	**31-40**	**41-50**	**51-60**
	16%	55%	17%	12%

Religion	**Hindu**	**Christian**	**Muslim**	**Other**
	12%	31%	3%	54%

Ethnicity	**East Indian**	**African**	**Mixed**	**Other**
	19%	58%	9%	14%

Profession	**CCN**	**RN**	**ENA**
	44%	33%	23%

How long have you been working in this unit	**< 6 months**	**6mth -1yr**	**2-5yrs**	**5-10yrs**
	3%	11%	50%	36%

Highest level qualification	**ENA**	**RN**	**Post basic Reg**	**BScN**	**MScN**
	16%	36%	27%	16%	5%

Where did you receive your basic training in the profession	**MOH**	**COSTAATT**	**UWI**	**USC**	**OTHER**
	34%	34%	5%	2%	25%

Experience in years	**0-10yrs**	**11-20yrs**	**21-30yrs**	**31-40yrs**
	52%	36%	6%	6%

Hand Washing Procedure with Alcohol-Based Hand Sanitizers

The next nine items in the checklist focused on the implementation of the policy for the hand washing procedure by nursing staff with the use of alcohol based sanitizers. Of the participants who applied the product to fully cover the palm and all surfaces, 34% were rated as average; 11% performed this excellently and an equal percent did so poorly. 33% were excellent when compared to 9% who poorly rubbed palm to palm. Of the participants who rubbed right palm over left dorsum with interlaced fingers, 27% performed poorly in contrast to 8% who performed excellently. Participants had extremely high percentages of poor ratings (50%, 53%, and 50%) when observed rubbing palm to palm with fingers interlaced, rubbing back of fingers to opposing palms with fingers interlocked and rotational rubbing of left thumb clasped in right palm respectively. Rating in the excellent category showed 5%, 3% and 8% respectively for the above mentioned procedures. Rotational rubbing backward and forward with clasped hands in left and vice versa revealed 34% received an average score and 5% performed excellently. Forty-four percent (44%) received an average score for allowing hands to air dry, while 11% received fair and good scores. Of the participants whose use of hand sanitizer as a means of hand asepsis lasted 20 – 30 seconds long, 30% received average scores and 13% received good scores. In total, 41% of participants received average scores and 3% received excellent scores for complying with the policy procedure for the use of alcohol based sanitizers when washing hands.

Hand Washing Technique with Soap and Water

The last 13 items in the checklist observed participants to determine if the hand washing procedure with soap and water according to the policy was being implemented. Almost equal percentage of participants wet their hands under running water prior to applying soap. Of these, 33 % did so poorly while 34% performed this task with excellence. Of those who applied enough soap to cover all hand surfaces, 61% were average and 5% did this poorly. The same hand motions used with sanitizers were also observed during the soap and water technique. Thirty-seven (37%) received average scores when hands were rubbed palm to palm and 0% performed poorly in this category. Participants who rubbed palm over left dorsum with fingers interlaced and vice versa received 38% of fair scores and 3% of poor scores. Of those who then rubbed palm to palm with fingers interlaced 48% did so fairly and 16% did so poorly.

Poor scores, 14%, 28%, and 40%, were achieved by participants for the following procedures: hands rubbed with back of fingers to opposing palms with fingers interlocked; rotational rubbing of left thumb clasped in right palm; and rotational rubbing backward and forward with clasped hands in left palm and vice versa respectively. A mere 3%, 5%, and 6% of these participants respectively, scored excellent for these procedures. Of the participants who rinsed their hands with running water, one hand at a time 58% did so poorly, while 0% scored excellent. For those that dried their hands one at a time with a single use towel, 67% did so poorly and 0% received scores in the good and excellent categories. Sixty-eight (68%) of participants scored poorly in their use of towel to turn off tap and 14% did excellent in this procedure.

Of participants who disposed off towel, 59% did so excellently and 0% did so poorly. Forty-three percent (43%) of participants received average scores for taking 40-60 seconds to wash their hands whereas 2% scored poorly in this category. In total, 55% of participants gave an average performance of the hand washing procedure in compliance with the policy and 0% performed poorly.

DISCUSSION

Nurses play a key role in infection prevention and control; they constitute the largest percentage of the health care workers and are at the core of the health care system. Evidence based knowledge and up to date skills help to ensure that nurses provide quality care to patients and it strengthens infection prevention and control practices such as hand washing (Smith & Lockhorst, 2009). Every possibility for the transfer of microorganism from the skin or inanimate surface provides an opportunity for hand hygiene. Consequently, hand hygiene remains the most effective measure for the prevention of cross infection in the health care setting (Bjerke, 2004). One of the most commonly used surveillance methods and the one nearest to a gold standard is, direct observation (Dadonienė, Zagminas, & Berzanskyte, 2013). This methodology is employed by this study to investigate the technique of hand hygiene used by nursing personnel in three major ICUs in Trinidad and Tobago.

According the World Health Organization (2012), there is a critical need for hand hygiene during the delivery of health care in the prevention of cross infection. This remains the standard of care for all health care workers. However the researchers notice as depicted by the results in Table 4 only 5% of the sample population perform this task with excellence. The researchers also note that most of the nursing personnel, approximately two-thirds perform good or excellent hand hygiene when their hands are visibly soiled. However, before and after direct contact with patients and after removal of gloves, the results are less than favourable as personnel generally do not perform hand hygiene as well.

The Precede-Proceed model is used as the theoretical framework in this study and explains that the extent of patient contact, affects the nurses' decisions to wash their hands. Tasks which involve minimal contact with the patient, such as measuring heart rate and blood pressure as well as administering medication, clean linen or touching patient clothing is not considered motivating factors for hand washing (Whitby et al., 2006). Whereas visible body fluids and contact with axillae, genitals or groin, as well as procedures such as suctioning and dressing of wounds compelled nursing staff to wash their hands(Whitby et al., 2006). These results lead to the assumption that these health care workers believe that as long as they can't see the contaminant then it probably doesn't exist, as well as they should only wash their hands when dealing with soiled materials or before aseptic procedures.

However, according to the World Health Organization the five key moments when health care workers should wash their hands are: Before contact with a patient, before an aseptic task, after body fluid exposure risk, after patient contact and after contact with the patients surroundings (WHO, 2015). Alcohol based hand sanitizers, when used appropriately, significantly reduces the rate of infection in health care settings (Pickering, Davis, & Boehm, 2011). Therefore, use of the correct solution, in the correct volume, for the recommended duration while adhering to the acclaimed technique is essential to the effectiveness of hand hygiene (Salati & Kadi, 2014).

In 2013 a study was conducted in the Aseer Central Hospital, South-Western Saudi Arabia to determine hand hygiene non-compliance among intensive care unit health care workers. The results of this study showed that hand hygiene non-compliance differed among health care workers based on the five moments of hand hygiene. After body fluid exposure risk there is a low hand hygiene non-compliance of 30.8%, there is also low non-compliance of 16.9% after patient contact and 50% after contact with patient surroundings. Higher levels of non-compliance among health care workers were found before patient contact (59.3%). This indicates that the event before patient contact has a 6 times higher risk of hand hygiene non-compliance compared to the events after patient contact (Mahfouz, El Gamal, & Al-Azraqi, 2013).

The results from the use of hand sanitizers for hand hygiene in table 5 show that, 50% of participants performed poorly when rubbing palm to palm with fingers Interlaced, 53% performed poorly when rubbing back of fingers to opposing palms with fingers interlocked and 50% performed poorly for rotational rubbing of left thumb clasped in right palm and vice versa. In 2014 a research entitled “Is Hand Sanitizer or Hand Washing more effective in preventing Healthcare Associated Infections” was conducted by nursing students of the Nevada nursing association. The results of this study show that when sanitizing their hands most of the participants forgot to rub their thumbs and the back of their hands (Allen, Santos, Mischel, Salmonsen, & Tibbits, 2014).

From these results it is reasonable to construe that health care worker in the selected ICU’s lack knowledge regarding the recommended technique for effective hand hygiene when using the hand sanitizers. It is also observed by the research team that nurses in the three selected ICUs do not use hand sanitizers often which is evident by the results in table 5 which shows that only 3% of the population performed hand hygiene with hand sanitizers excellently whereas 41% gave an average performance. The study conducted by nursing students of the Nevada nursing association in 2014 confirms that the use of hand sanitizer has a higher rate of compliance by healthcare workers who were educated about its effective use (Allen, Santos, Mischel, Salmonsen, & Tibbits, 2014). The CDC also recommends the use of alcohol based sanitizers as the preferred method of hand hygiene for patient contact except when hands are physically soiled (Carter, 2013).

The process of hand hygiene is a technical skill that all health care workers need to acquire. It is not just putting one’s hands under water and rubbing (Canham, 2011). Once performed, precision hand hygiene prevents the colonization and subsequent infection of patients and staff alike and also prevents contamination of the environment (Canham, 2011). When performing hand hygiene using soap and water, there are additional steps that need to be followed for a longer duration of time for completion (WHO, 2014). These steps include: rinse with running water, one hand at a time; dry hands one at a time with a single use towel; and use towel to turn off tap. These are important steps to follow as it eliminates the possibility of recontamination (Canham, 2011). However, as seen in Table 6, these steps are performed poorly by 58%, 67% and 68% of participants respectively.

According to Canham (2011), wet hands transfer pathogens much more readily than dry hands not washed at all. As a result, it is of utmost importance that hands be thoroughly dried after performing hand hygiene and the method of single-use towels performed with each hand washing procedure. Recontamination must be avoided when drying hands and turning off the tap. According to the World Health Organization (2014), the correct performance of the hand hygiene techniques results in increased product coverage and greater reductions of bacterial colony forming units when compared with incomplete actions (WHO, 2015).

Overall the results from this study showed that only 3% of the participants performed the correct hand washing procedure with soap and water excellently and 55% gave an average performance. This showed that nurses in the three selected ICUs do not perform the hand washing procedure according to the guidelines in the infection and control policy for hand washing. The intensive care unit is a critical area of care which shows high levels of hospital acquired infections because of poor hand hygiene. A recent study conducted in the ICU of the University Hospital in Riyadh, Saudi Arabia observed an overall non-compliance rate of 58%.

In 2010 Erasmus, Daha, Brug, Richardus and Behrendt conducted a systematic review of studies on compliance with hand hygiene guidelines in hospital care. This systematic review analysed 65 global studies and found an overall compliance rate of 30%-40%; further research into the behavioural determinants of hand hygiene, has been identified as the solution to the universal problem of non-compliance with hand hygiene guidelines (Mahfouz, et al. 2013).

Table 2: Indications for hand washing

Indications for hand washing	P	F	A	G	E
Visibly dirty or contaminated material	0	5	25	34	36
Visibly soiled with body fluids or blood	0	5	18	38	39
Before direct contact with patients	23	44	8	19	6%
After direct contact with patients	9	47	33	6	5
After removing gloves	0	48	19	8	6
Before contact with an invasive devices regardless of use of gloves	23	14	41	20	2
After contact with non-intact skin or wound dressing	3	11	23	36	27
During patient care when moving from a contaminated body site to a clean body site	9	23	34	25	9
Before handling medication or preparing food	8	11	54	13	14

Poor- P, Fair-F, Average- A, Good- G, Excellent – E.

Table 3: Hand washing procedure with alcohol-based hand sanitizers

Hand sanitizer	P	F	A	G	E
The amount of product applied is a palm full and covers all surfaces	11%	31%	34%	13%	11%
Then rub palm to palm	9%	14%	25%	19%	33%
Rub right palm over left dorsum with interlaced fingers and vice versa	27%	26%	17%	22%	8%
Followed by rubbing palm to palm with fingers interlaced	50%	13%	16%	16%	5%
Rub back of fingers to opposing palms with fingers interlocked	53%	23%	13%	8%	3%
Rotational rubbing of left thumb clasped in the right palm and vice versa	50%	13%	18%	11%	8%
Rotational rubbing, backwards and fore wards with clasped hands in left palm and vice versa	17%	25%	34%	19%	5%
Allow hands to air dry	16%	11%	44%	11%	18%
Procedure last 20 – 30 seconds	13%	20%	30%	13%	24%

Poor- P, Fair-F, Average- A, Good- G, Excellent – E.

Table 4: Hand washing procedure with soap and water

Soap and water hand washing	Poor	Fair	Average	Good	Excellent
Wet hands under running water	33%	16%	12%	5%	34%
Apply enough soap to cover all hand surfaces	5%	13%	61%	10%	11%
Hands are rubbed palm to palm	0%	2%	37%	31%	30%
Rub right palm over left dorsum with interlaced fingers and vice versa	3%	38%	36%	17%	6%
Then rub palm to palm with fingers interlaced	16%	48%	17%	11%	8%
Hands are rubbed with back of fingers to opposing palms with fingers interlocked	28%	36%	25%	8%	3%
Rotational rubbing of left thumb clasped in right palm and vice versa	40%	19%	22%	14%	5%
Rotational rubbing, backwards and fore wards with clasped hands in left palm and vice versa	14%	25%	36%	19%	6%
Rinse with running water, one hand at a time	58%	22%	14%	6%	0%
Dry hands one at a time with a single use towel	67%	19%	14%	0%	0%
Use towel to turn off the tap	68%	5%	11%	2%	14%
Dispose of towel	0%	3%	16%	21%	59%
The procedure last 40 – 60 seconds	2%	9%	43%	15%	31%

REFERENCES

Allen, L., Santos, J. D., Mischel, V., Salmonsen, A., & Tibbits, J. (2014). Is Hand Sanitizer or Hand Washing More effective in preventing Healthcare Associated Infections. Nevada RNformation, 18. Retrieved from http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=4&sid=1ed71baf-1299-4cb0-9e7d-8f73e49bdf91%40sessionmgr113&hid=4203

Bearman, G., & Munro, C. (2006, june). Infection control and prevention. Retrieved from Pubmed.gov: http://www.ncbi.nlm.nih.gov/pubmed/16791763

Bevins, T. (1999). Quantitative Designs. Retrieved from fgcu.edu: http://ruby.fgcu.edu/courses/sbevins/50065/qtdesign.html

Burns, N., & Groves, S. K. (2011). Clarifying Measurement and Data Collection in Quantitative Research. In N. Burns, & S. K. Groves, Understanding Nursing Research:Building an Evidenced Based Practice 5th Edition (p. 326). Missouri: Saunders Elsevier.

Canham, L. (2011, January 1). The First Step in Infection Control is Hand Hygiene. The Dental Assistant, 42-46.

Carita, C., Schub, E., & Pravikoff, D. (2014). Hand Hygiene: Antisepsis Using an Alcohol-Based Rub. Retrieved 2015, from http://web.ebscohost.com/nrc/pdf?sid=50a83ebc-6489-4454-bf2b-e89a8147f75a%40sessionmgr4005&vid=2&hid=4209

Carter, D. (2013). The Right balance Between Hand sanitizers and Hand washing. American Journal of Nursing, 113(7), 13. Retrieved from http://journals.lww.com/ajnonline/Fulltext/2013/07000/The_Right_Balance_Between_Hand_Sanitizers_and.7.aspx

Centers for Disease Control and Prevention (2009) Retrieved March 12, 2014 from www.cdc.gov/hicpac/2009IP/2009ip-part1-html

Cohen, J., Opal, S. M., & Powderly, W. G. (2010). Infectious Diseases. Retrieved from expertconsultbook.com: http://www.expertconsultbook.com/expertconsult/ob/book.do?method=display&type=bookPage&decorator=none&eid=4-u1.0-B978-0-323-04579-7..00006-X&isbn=978-0-323-04579-7#lpState=opened&lpTab=contentsTab&content=4-u1.0-B978-0-323-04579-7..00006-X--s0015%3Bfrom%3

Collins., A. S. (2006, March 12). Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Retrieved February 11, 2014, from Bookshelf: http://www.ncbi.nlm.nih.gov/books/NBK2683/

Cross infection. (2014). Farlex, The Free Dictionary. Retrieved from http://medical-dictionary.thefreedictionary.com/cross+infection

Declan, T. (2009). Importance of Continuing Nursing Education. Retrieved from UASEducation.com: http://www.uaseducation.com/articles/666/1/Importance-of-Continuing-Nursing-Education/Page1.html Dengler, M. (2011, April 1st). What is Quantitative Research. Retrieved from Research and Marketing Strategies: The Research Bunker: http://rmsbunkerblog.wordpress.com/2011/04/01/what-is-quantitative-research/

Ellis, K. (2015). Infection Control Today. Retrieved from www.infectioncontroltoday.com: http://www.infectioncontroltoday.com/articles/2005/01/surveillance.aspx

Erkan, T., Tukoc, B., & Findik, U. Y. (2011). Hand washing behaviour and Nurses Knowledge after a training programme. International Journal of Nursing Practice, 17(5), 464-469. Retrieved from http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=9&sid=1ed71baf-1299-4cb0-9e7d-8f73e49bdf91%40sessionmgr113&hid=4203

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. The Qualitative Report volume 8 Number 4, 597-607.

Inweregbu, K., Jayshree, D., & Alison, P. (2005). Nosocomial infections. Oxford Journals, 14-17. doi:10.1093/bjaceaccp/mki006

Mahfouz, A. A., El Gamal, M. N., & Al-Azraqi, T. A. (2013). Hand hygiene non-compliance among intensive care unit health care workers in Aseer Central Hospital, south-western Saudi Arabia. International Journal of Infectious Diseases, 17(9), e729-e732. doi:10.1016/j.ijid.2013.02.025

Ministry of Health, Trinidad and Tobago. (2011). Infection Prevention and Control Policies and Guidelines For Health Care Services. Port of Spain: Ministry of Health, Trinidad and Tobago.

Muhammad, D. W., Mahmoud, A.-H., Iyad, A. I., & Manal, A.-S. (2012). Investigating Jordanian nurses' handwashing beliefs, attitudes, and compliance. American Journal of Infection Control, 40(7), 643-647. doi:10.1016/j.ajic.2011.08.018.

Onuoha, PC & Brieger WR (1992). Continuing Education Experiences of District Level Health Staff in Nigeria. International Quarterly of Community Health Education, volume 13, number 4, pp. 389-403. DOI: 10.2190/9CN6-Y1D4-7QN4-2Hk7.

Pickering, A. J., Davis, J., & Boehm, A. B. (2011). Efficacy of alcohol-based hand sanitizer on hands soiled. Journal of Water and Health, 9(3), 429-433. doi:10.2166/wh.2011.138

Salati, S. A., & Kadi, A. (2014, October29). Hand Hygiene Practices in Medical Students: A Follow-Up Study. (A. S. Al-Mulhim, Ed.) ISRN Otolaryngology, 2014(591879), 1-5. doi:10.1155/2014/591879

Smith, J. M., & Lockhorst, D. B. (2009). INFECTION CONTROL: CAN NURSES IMPROVE HAND HYGIENE PRACTICES? Retrieved 2015, from nursing. arizona. edu: http://juns.nursing.arizona.edu/articles/fall%202009/infection%20conrol.htm

Stathopoulou, H. G., & Skourti, I. G. (2010). Health Care Workers Participation in Influenza Vaccination Programs. Health Science Journal, 142-148.

Stewardson, A. J., Iten, A., Camus, V., Gayet-Argeron, A., Caulfield, D., Lacey, G., & Pittet, D. (2014, September). Efficacy of a New Educational Tool to Improve Handrubbing Technique amongst Healthcare Workers: A Controlled, Before-After Study. PLoS ONE, 9(9), 1-9. doi:10.1371/journal.pone.0105866

Stone, P. (2014). Study reveals infection control practices not adequately implemented in ICUs. Retrieved from infectioncontroltoday.com: http://www.infectioncontroltoday.com/news/2014/01/study-reveals-infection-control-practices-not-adequately-implemented-at-many-hospital-icus.aspx

Wagner, C. (2013, August 23). Infection Preventionists Invaluable to Improving Hand Hygiene Rates and Decreasing HAIs. Retrieved from infection control today.com: https://www.infectioncontroltoday.com/news/2013/08/infection-preventionists-invaluable-to-improving-hand-hygiene-rates-and-decreasing-hais.aspx

Weinstein, R. A., & Bonten, M. (2002, September 24). Retrieved February 10, 2014, from Kluwer Academic Publishers Group: http://books.google.tt/books?id=KNH-BGUzP2EC&pg=PA2&lpg=PA2&dq=cross+infection+in+icu&source=bl&ots=U8u494x7q&sig=nWt4jebNmqAXgoHozkhOcAoIs5Y&hl=en&sa=X&ei=WM_6UrW2MqX42AWJ6ID4Dg&ved=0CGwQ6AEwCQ#v=onepage&q&f=true

Whitby, M., Mclaws, M.-l., & Ross, M. W. (2006). Why Health Care Workers Dont Wash Their Hands. Chicago Journals; The Society For Healthcare Epidemiology Of America, 484-492.

WHO. (2015). Retrieved from Your 5 moments of hand hygiene: http://who.int/gpsc/tools/5momentsHandHygiene_A3.pdf?ua=1