International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 05, Issue 06, June 2020,
https://doi.org/10.23958/ijirms/vol05-i06/891

Original article

Assessing Knowledge, Attitude, and Practices on Hospital Acquired Infections Control by Anaesthesia Practitioners in the Operating Theatres of the Tamale Teaching Hospital (TTH); Ghana

Martin Mumuni Danaah Malick [1], Edem Yao Akpa [2], Peter Paul Bamaalabong [3],

[1]University for Development Studies, Department of Pharmacy,
[2]University for Development Studies, Department of Anesthesiology and Intensive Care,
[3]University for Development Studies, Department of Anesthesiology and Intensive Care,

[*]Corresponding Author: Martin Mumuni Danaah Malick; *mdanaah@uds.edu.gh*

Received 03 May 2020; Accepted 30 May 2020; Published 13 June 2020

Abstract

Background: Hospital Acquired Infections (HAIs) place a significant economic burden on the healthcare system. Infection control practices are important in minimizing healthcare associated infections. However, low compliance with Universal and Standard Precautions has been reported in a number of studies. The Centre for Disease Control and Prevention (CDC) developed baseline definitions for HAIs that were republished in 2004 and has defined HAIs as those that develop during hospitalization but are neither present nor incubating upon the patient's admission to the hospital; generally, these infections occur between 48 to 72 hours after admission and within 10 days after hospital discharge. this study aimed at unveiling the level of knowledge, attitude and practices on infection prevention control in the operating theatres by anaesthesia practitioners at TTH. Materials and ***Methods:*** A cross-sectional study design was employed. A mixed-method approach was used for data collection which includes a structured questionnaire carried out via face to face interview and observation. ***Results:*** The study showed that 100% of the respondents have knowledge on hospital acquired infection control in the theatre in one way or the other whereas attitude and practices toward hospital infection control in the operating theatres are undesirable in some specific areas of infection control such as wearing of sterile gowns and goggle. As high as 80.6% and 69.4% do not wear goggle and gowns respectively whilst performing regional anaesthesia. ***Conclusions:*** This study demonstrated that anaesthetists at TTH have reported sub-optimal levels of compliance i.e. attitude and practices with selective infection control. The study further demonstrated that discrepancies exist between anaesthetists' attitudes towards a guideline as well as their actual practice.

Keywords: ***Knowledge, Attitudes, Nosocomial infections, Hospital Acquired Infections, Anaesthesia Practitioners, Operating theatres.***

Introduction

Nosocomial infections also known as Healthcare Associated Infections or Hospital Acquired Infections (HAIs) place a significant economic burden on the healthcare system [1]. Infection control practices are important in minimizing healthcare associated infections. However, compliance with Universal and Standard Precautions has been reported in a number of studies to be low. Not many of these studies are from low and middle-income countries, which could have cultural, managerial, educational level, financial and environmental factors that may influence compliance differently from developed countries. World Health Organization (WHO) describes hospital acquired infection to be one of the major infectious diseases having huge economic impact worldwide [2]. These infections affect about 2million people annually resulting in 5% to 15% of them requiring hospitalization [3,4]. Anaesthesia practitioners are very paramount in nosocomial infection preventions. There are a lot of procedures anaesthetists undertake that breach the physiological barriers allowing for possible contamination of micro-organisms and consequent development of infection. An example of such procedures includes; tracheal intubation, venous access, neural blocks etc. Inadequate knowledge, negative attitude and non-adherence to standard or recommended practices can lead to micro-organism transmission from patient to patient, from anaesthetists to patients or from patients to anaesthetists. Observation of good hygiene, adequate cleaning of anaesthesia equipment, use of proper and clean protective clothing, adequate skin preparation of the patient etc. can reduce the risk of infection transmission. Healthcare acquired infections have been regarded as a public health problem globally

and are on the increase despite efforts made by hospitals and their managements to control the rate of infection and contribute significantly to mortality and morbidity [5]. It is by nature that any micro-organism has the potential to cause infection in hospitalized patients but only a few including Staphylococci, Escherichia coli, Pseudomonas aeruginosa, Enterococci, fungi and to lesser extent, viruses and parasites are responsible for the majority of healthcare acquired infections [5].

Patients are hospitalized with the aim to ensure that they recover from their illnesses but this is not always so. Sometimes, their health deteriorates and healthy people get infected in healthcare facilities. The occurrence and unwanted consequences of HAIs have been known for several decades and continue to escalate at an alarming rate [6]. HAIs constitute a serious global public health challenge, causing untold suffering to about 1.4 million people across the world at any given time [7]. They often increase costs of health care on both patients and health services [8]. Many HAIs are preventable as it has been shown that compliance with guidelines greatly reduces both the rate and number of infections [9]. Among the many factors responsible for continued increase of HAIs in hospitalized patients are: poor immune status of patients; extremes of age, use of medical procedures and/or invasive techniques/devices, emergence of drug-resistant bacteria and over- crowding in hospitals [10,11]. Poor infection control practices may also facilitate micro-organism transmission. Studies found that hand washing, education, personal hygiene, knowledge of risky practices, immunization, interaction with public health officials when illness occurs and interruption of faecal-oral spread [11;12;13] are all essential for containment of HAIs. A good knowledge of health professional about HAIs will help reduce their prevalence among hospitalized patient and the health workers [14;15]. HAIs has been reported to be high in sub-Saharan Africa and range between 21.2-35.6% [16] However, simple and effective control programmes together with effective training of healthcare workers will go a long way in reducing the endemic nature of nosocomial infections in sub Saharan Africa. A study conducted in Addis Ababa, Ethiopia to understand hospital infection control practices revealed that 90% of the healthcare workers had good knowledge of infection prevention practices [17] However, there was knowledge-practice discrepancies. In a similar study in South West Ethiopia, to assess knowledge, attitude and practice towards infection control measures among General hospital staff resulted in a high knowledge but less practice [18] The same knowledge-practice discrepancy was also identified in a study conducted in Uganda to describe infection control knowledge, attitudes and practices among healthcare workers indicated that almost all HCWs had knowledge on infection prevention [19]. A systematic review indicated high knowledge of majority of staff towards infection prevention and control but low knowledge-practice [20]. Many studies have reported varying levels of knowledge regarding infection control in HCWs, and the proportion of HCWs who were aware of these practices ranged from 16 - 75%. A study of HCWs in Nepal reported that 16% of HCWs had knowledge of infection control [21]. A study in Jordan reported that 49.6% of HCWs had knowledge of infection control, whereas a study in India reported that 75.5% of staff nurses at a tertiary care hospital had knowledge of infection control [22;23]. Attitude of healthcare staff mainly helps in reducing the rate of HAIs. There are approved and recommended attitudes that healthcare staff need to exhibit in the healthcare setting in other to prevent the spread of HAIs both at work and home. In a study that aims to establish baseline attitude towards infection control and compliance with specific Operating Department (OD) guidelines [24], indicated that 87% of the staff at the OD always wash their hands after touching bodily fluids. It further indicated that 12% strictly adhered to the guideline (i.e. never recap used sharps and needles) however, 42% occasionally recap. Even though 68% of the respondents in the same study agreed with the policy of using face mask, the declared compliance rate is 86% and about 55% of the respondents complied with changing clothes on exit and re-entry into the OD.

Wide variations in compliance were recorded concerning individual infection control guidelines in various studies. Hand washing rate ranges from 27-86% with the average of 52% [25]. It was reported by Gammon et al that, glove, gown and eye protection rates were on average 62%. The same study reported that the average compliance rate of facemask use is 30% [26].

Materials and Methods

This research was conducted in the operating theatres of Tamale Teaching Hospital. Tamale Teaching Hospital is a referral hospital serving the three northern regions of Ghana. It is about 400 bed capacity facility. It also serves as the main teaching facility for the school of medicine and health sciences of university for development studies. It has about 10 operating theatres. A cross-sectional study design was employed. A mixed-method approach was used. Both the questionnaire and observation methods were used to collect data at the TTH for the study. The study population consist of all anaesthetists at the TTH and the sample size was all the anaesthetists available during the period data collection. All anaesthetists were interviewed except three people who were on annual leave at the time of the study. The study duration was five months. It was done between the months of February 2017 to June 2017. The researcher took two days to train field officers on the research tool and how to manage data. The training programme was centred on methods of conducting oral interviews, taking detailed field notes during observation. A structured questionnaire was used to collect the data via face to face interview and observation. The first part of the questionnaire consisted of the demographic characteristics of the respondents such as age, sex, level of education and number of years of practice. Part two of the questionnaire captured respondent's knowledge on nosocomial infection prevention, attitude on hospital acquired infection prevention and hospital acquired infection prevention practices.

The questionnaire was administered using both a face-to-face interview and observation. The advantage of using the face-to-face interview was to eliminate non-response and incomplete data from the study and observation also help to see what the respondents actually do, although it is time consuming. To secure the consent of respondents, the study's purpose was explained to enable them to decide whether to participate or not. All anaesthesia personnel working at the TTH were included in the study. No anaesthesia personnel were excluded from the study except those on annual leave during the period of the data collection. Permission was sought from the research and ethical committee of the hospital through the department of anaesthesia, University for Development Studies. Consent was also sought from anaesthetists as well. Letters indicating the study's purpose and its intended start date was directly delivered to the managers of the facility. The managers subsequently reviewed and approved the study and indicated their readiness for the start of data collection. Statistical Package for the Social Science (SPSS)version 20 and descriptive statistics was used. Frequency tables and charts were used to display the necessary variables relevant to the study.

Results

Demographic characteristics of respondents are presented in Table 1. Below. Results indicate that majority of the respondents were male anaesthetists (83.3%) against female anaesthetists of 16.7%. More of the respondents were in the 30-34yrs age group (44.4%) with 35-39yrs forming 33.3% of the respondents. Majority of the respondents (61.1%) holds an advanced level diploma certificate while 38.9% holds a bachelor's degree certificates. Table.1 further depicts that half (50%) of the respondents had working experiences of 0-4 years while 38.9% had 5-9years working experience.

Religious affiliation presented indicates that 55.6% of the respondents were Christians while 44.6% were Muslims.

Table 1: Demographic characteristics of respondents

Demographic Characteristics	Frequency (n)	Percent (%)
Age		
25-29yrs	3	8.3
30-34yrs	16	44.4
35-39yrs	12	33.3
40yrs +	5	13.9
Gender		
Male	30	83.3
Female	6	16.7
Educational Level		
Advanced Diploma	22	61.1
Bachelor Degree	14	38.9
Working Experience		
0-4yrs	18	50.0
5-9yrs	14	38.9
10yrs & above	4	11.1
Religious Affiliation		
Christian	20	55.6
Islamic	16	44.4

The availability of an infection prevention guideline presented in Table 2. Results from the table indicate that 83.3% of the respondents reported that recommended infection prevention guideline is available while 16.7% responded in the negative even though, all respondents (100%) have knowledge on infection prevention guidelines. The source of information about infection prevention guidelines indicated that majority of the respondents (55.6%) got the knowledge from attending training courses while 22.2% got it from own research and oral communication.25% of the respondents reported that infection prevention and control (IPC) guidelines were readily available to see and read while 75% reported in the negative. As to whether the guideline affects their scope of work positively, 33.3% reported that the guideline does not affect their scope work anyway while 66.7% of the respondent's reported that the guideline affects their scope of work positively. Respondents' adherence to IPC guideline indicated that 72.2% adhere strictly to IPC practices while 27.8% does not adhere to it strictly.

Table 2: Knowledge about Infection prevention guideline

Knowledge, Attitude & Practice	Frequency (n)	Percent (%)
Knowledge on availability of IP guideline		
Yes	30	83.3
No	6	16.7
Source of Information		
Oral Communication	8	22.2
Own Research	8	22.2
Training Courses	20	55.6
Guideline (protocol) readily available		
Yes	9	25.0
No	27	75.0
Guideline affect scope of work		
Yes	6	66.7
No	3	33.3
Adhere strictly to IPC practices		
Yes	26	72.2
No	10	27.8

Respondents' infection control practices in the operating theatre may be described as moderate. Results in Table 3 show that items that received the lowest mean scores were wearing of goggles (Mean = 0.58; standard deviation (SD) = 0.77) and wearing of gowns (Mean = 0.83; SD = 0.94). Descriptive statistics have indicated that all (100%) of the anaesthetists change their clothes when leaving the operating theatre to their various homes. The majority (69.4%) of the respondents always change clothing's on exit and re-entry into the operating theatre. More than half of the respondents wear face masks (63.9%) and wash hands before and after procedure. On Observation, majority of the respondents always and sometimes recap used needles, only 13.9% that do not recap used needles.

Table 3: Descriptive statistics of practices of infection control measures

Infection prevention practices	Never (%)	Sometimes (%)	Always (%)	Mean (1-3)	SD
Hand washing before and after procedure	0	36.1	63.9	2.64	0.487
Recap of used needles	13.9	47.2	38.9	1.89	1.09
Wearing of face masks	0	36.1	63.9	2.61	0.549
Wearing goggles	58.3	41.7	0	0.58	0.77
Wearing of gloves	0	25	75	2.75	0.439
Wearing gowns	44.4	47.2	8.3	0.83	0.941
Change clothes on exit and re-entry	5.6	25	69.4	2.44	0.939
Change clothes when leaving the theatre	0	0	100	4	0

PPE's are worn to protect one from getting in contact with dirt, blood, fluid or infection. During the tracheal intubation procedure, it was reported that all respondents (100%) always wear gloves, 91.7% always wear face masks and 91.7% never wear goggles, and 88.9% never wear sterile gowns (Table 4). However, all the protective clothing's are needed during the procedure.

Table 4: Personal Protective Equipment (PPE) usage by anaesthesia practitioners during Tracheal intubation

Procedure	Frequency (n)	Percent (%)
Tracheal intubation		
Face Mask		
Always	33	91.7
Sometimes	2	5.6
Never	1	2.8

Gloves		
Always	36	100
Sterile Gown		
Always	1	2.8
Sometimes	3	8.3
Never	32	88.9
Goggles		
Always	1	2.8
Sometimes	2	5.6
Never	33	91.7

PPE's worn during extubation are presented in Table 5 below. Results indicate that 91.7% of the respondents wear face masks always and 100% always wear gloves. However, 97.2% never wear goggles during the procedure while 86.1% never wear sterile gowns.

Table 5: PPE usage by Anaesthesia practitioners during extubation

Procedure	Frequency (n)	Percent (%)
Extubation		
Mask		
Always	33	91.7
Sometimes	3	8.3
Gloves		
Always	36	100
Sterile Gown		
Always	2	5.6
Sometimes	3	8.3
Never	31	86.1
Goggles		
Sometimes	1	2.8
Never	35	97.2

Results from Table. 6 presented PPE's worn during regional block, indicated that 88.9% of anaesthetists always wear face masks and 100% wear gloves. Yet, 80.6% and 69.4% never wear goggles and sterile gowns respectively.

Table 6: PPE usage by anaesthesia practitioners during regional block

Procedure	Frequency (n)	Percent (%)
Regional block		
Mask		
Always	32	88.9
Sometimes	3	8.3
Never	1	2.8
Gloves		
Always	36	100
Sterile gown		
Always	1	2.8
Sometimes	10	27.8
Never	25	69.4
Goggles		
Sometimes	7	19.4
Never	29	80.6

Table 7 presents PPE's worn during peripheral block. Results indicate that 100% always wear gloves and 52.8% always wear face masks during the procedure. Hitherto, 86.1% and 83.3% never wear goggles and sterile gowns respectively.

Table 7: PPE usage by anaesthesia practitioners during peripheral block

Procedure	Frequency (n)	Percent (%)
Peripheral		
Mask		
Always	19	52.8
Sometimes	13	36.1
Never	4	11.1
Gloves		
Always	36	100
Sterile gown		
Always	1	2.8
Sometimes	5	13.9
Never	30	83.3
Goggles		
Always	1	2.8
Sometimes	4	11.1
Never	31	86.1

Results from Table 8 which presents PPE's worn during vascular access indicate that 100% of respondents always wear gloves. However, 97.2%, 91.7% and 63.9% never wear goggles, sterile gowns and face masks respectively during the procedure.

Table 8: PPE usage by anaesthesia practitioners during vascular access

Procedure	Frequency (n)	Percent (%)
Vascular Access		
Mask		
Always	4	11.1
Sometimes	9	25
Never	23	63.9
Gloves		
Always	36	100
Sterile gown		
Sometimes	3	8.3
Never	33	91.7
Goggles		
Sometimes	1	2.8
Never	35	97.2

Distribution of hand hygiene practice is represented in Figure 1and Figure 2 below. Results indicate that only 31% of the respondents reported that alcohol hand gel is readily available at the theatre while 69% reported that it is not always available. From the analysis on availability of water and soap for hand washing indicated that 78% reported water and soap is always available for hand washing while 22% reported otherwise.

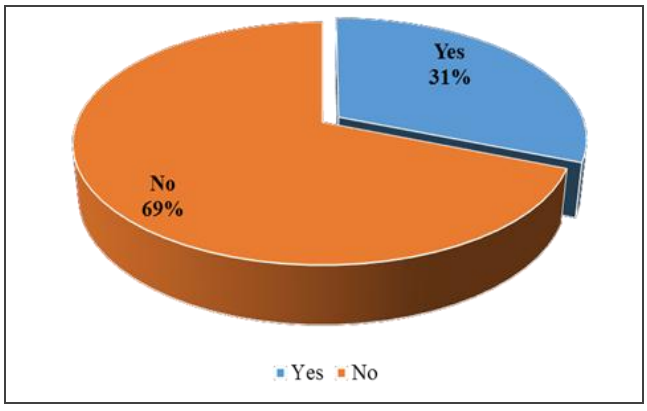

Figure 1: Availability of alcohol hand gel in the operating theatres

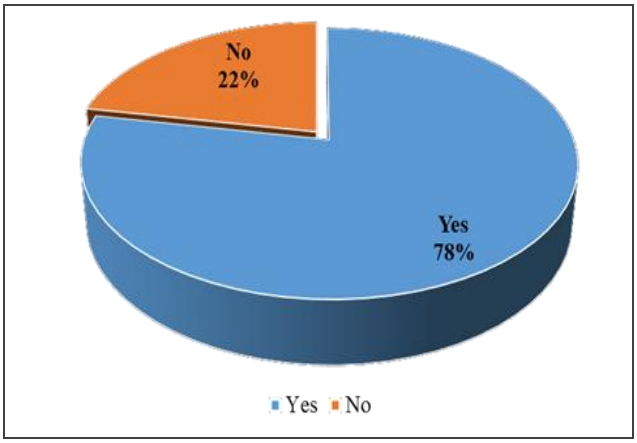

Figure 2: Availability of Soap and water in the operating theatres

Situations of hand washing is presented in the Table 9. The results from the analysis indicated that at the beginning of the days' work, 58.3% of respondents sometimes wash their hands, 27.8% always wash their hands at the beginning of the day and 13.9% never wash their hands at the beginning of the day but observation revealed that none (0) wash their hands always at the beginning of the day and majority (75%) sometimes wash their hands at the beginning of the day. In between cases, it was reported that 58.3% of respondents always wash their hands, 33.3% sometimes wash their hands in between cases but 8.3% never wash their hands in between cases whereas observation indicated that only 22.2% always wash their hands in between cases. After coming into contact with patient, only one (1) respondents representing (2.8%) never wash hands but 63.9% always wash their hands while 33.3% sometimes wash hands after coming into contact with patient and observation indicated that majority (80.6%) sometimes wash their hands. Before and after inducing anaesthesia, 44.4% always wash their hands but 47.2% sometimes wash their hands and 8.3% never wash their hands before and after inducing anaesthesia whereas on observation, only 13.9% always wash their hands but 77.8% sometimes wash their hands before and after inducing anaesthesia. Before and after regional block procedure, it was reported from the analysis that 75% of respondents always wash their hands, 22.2% sometimes wash their hands and 2.8% never wash their hands whereas observation revealed that only 33.3% always wash their hands and 61.1% sometimes wash their hands before and after regional block. Before and after other procedures, it was reported that 69.4%, 52.8% and 47.2% of respondents always wash their hands before and after peripheral block, vascular access and before and after removing gloves but it was observed that only 11.1% always wash their hands and 86.1% sometimes wash their hands before and after peripheral block. 88.9% and 77.8% sometimes wash their hands before and after vascular access and before wearing and after removing gloves respectively. However, 2.8%never wash their hands before and after peripheral block. Also,2.8% and 8.3%, never wash their hands before and after removing of gloves respectively.

Table 9: Situations of Hand Washing by anaesthesia practitioners (Self-reported and observed)

Situations of hand washing	Self-Reported (Response) Frequency(n)	Percent (%)	Observed Frequency(n)	Percent (%)
Beginning the day				
Never	5	13.9	9	25.0
Sometimes	21	58.3	27	75.0
Always	10	27.8	0	0.0
In between cases				
Never	3	8.3	8	22.2
Sometimes	12	33.3	20	55.6
Always	21	58.3	8	22.2
After coming into contact with a patient				
Never	1	2.8	3	8.3
Sometimes	12	33.3	29	80.6
Always	23	63.9	4	11.1
Before and after inducing anaesthesia				
Never	3	8.3	3	8.3
Sometimes	17	47.2	28	77.8
Always	16	44.4	5	13.9
Before and after regional block				
Never	1	2.8	2	5.6
Sometimes	8	22.2	22	61.1
Always	27	75.0	12	33.3
Before and after peripheral blocks				
Never	1	2.8	1	2.8
Sometimes	10	27.8	31	86.1
Always	25	69.4	4	11.1
Before and after vascular access				
Never	1	2.8	3	8.3
Sometimes	16	44.4	32	88.9
Always	19	52.8	1	2.8
Before wearing and after removing gloves				
Never	3	8.3	8	22.2
Sometimes	16	44.5	28	77.8
Always	17	47.2	0	0.0

Cleaning of anaesthesia equipment is important in the infection prevention and control practice. It was observed that 66.7% of the respondents always clean anaesthesia equipment while 30.6% clean it sometimes and 2.8% never clean anaesthesia equipment (Figure 3). But 91.7% of the respondents use 0.5% chlorine or spirit to clean the equipment while 2.8 use ordinary water to clean and 5.6% did not know what is used to clean the equipment. Anaesthesia equipment cleaned is presented in (Figure 4) and results indicate that Laryngoscope and Guedell airways are always 100%kept clean. However, 94.4% of the anaesthetists clean Supra-glottic devices always while 75% clean Suction tubes always and 66.7% always clean Magill forceps.

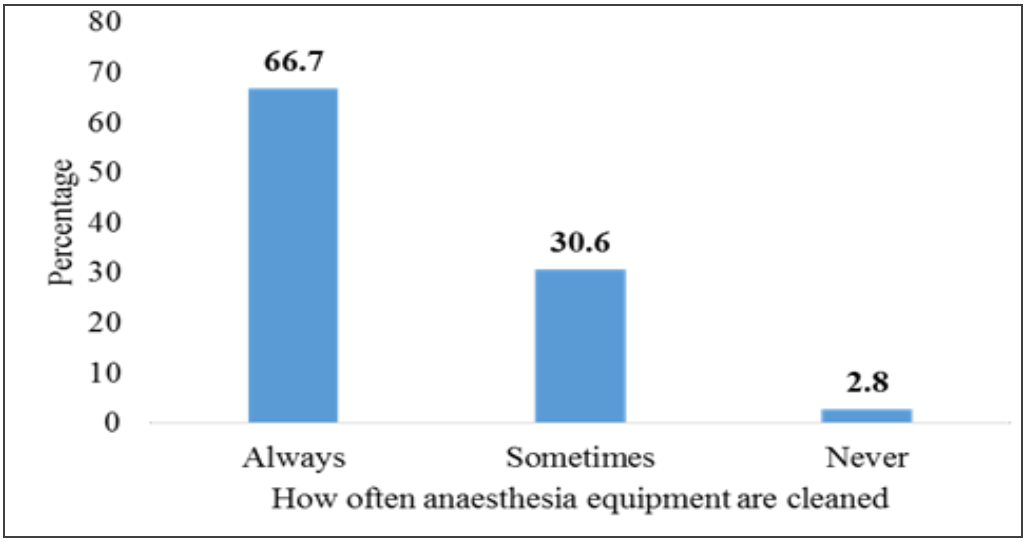

Figure 3: Frequency of Cleaning of anaesthesia equipment by anaesthesia practitioners

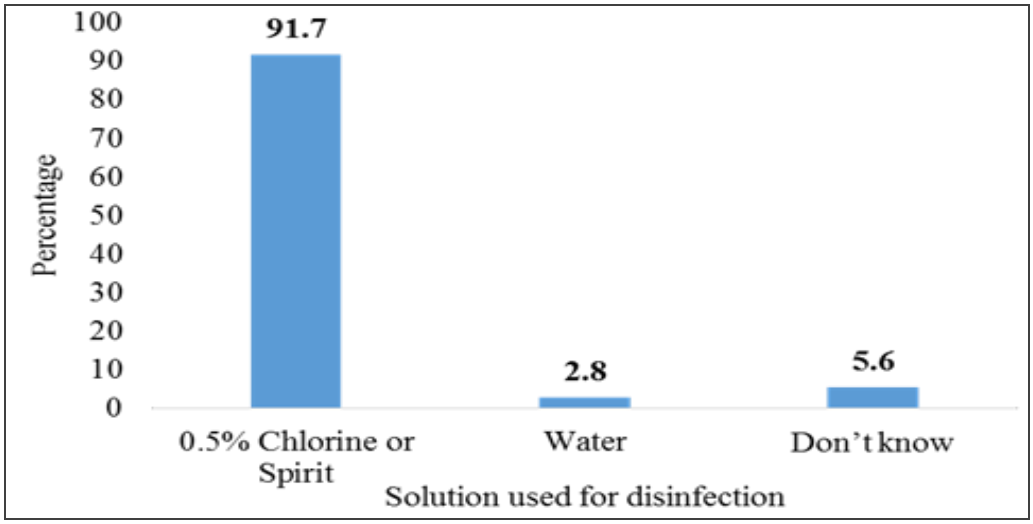

Figure.4: Types of substances used in cleaning anaesthesia equipment

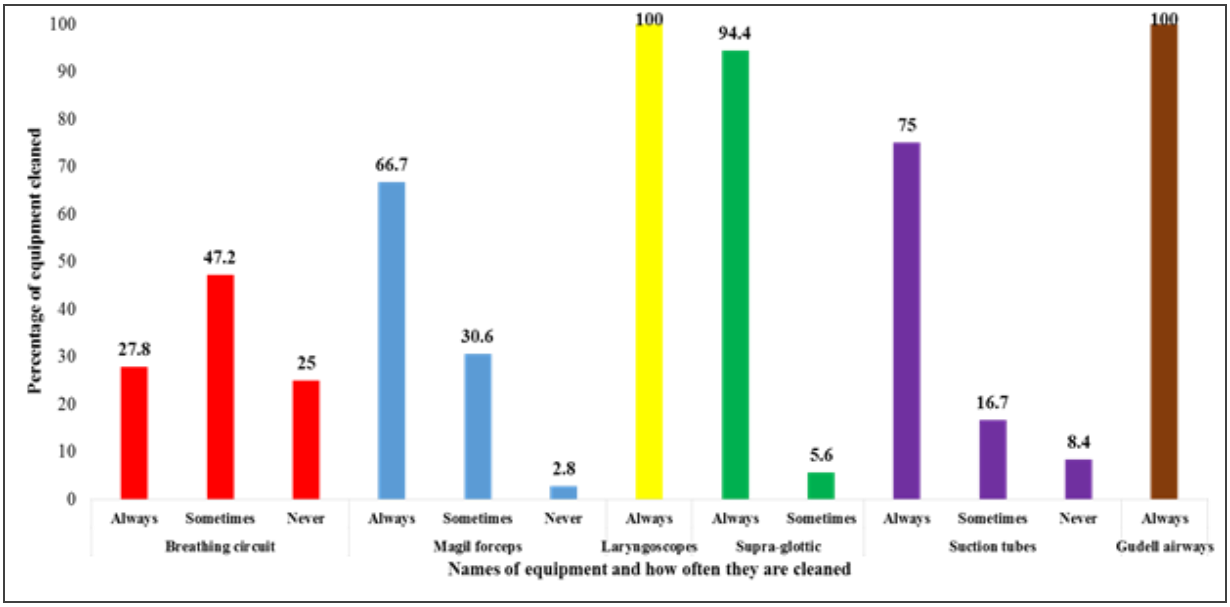

Figure 5: Types of Anaesthesia equipment cleaned by anaesthesia practitioners

The Laryngoscopes were the most cleaned always (100%) by anaesthesia practitioners according to the results depicted in Figure. 5

An overwhelming number (89%) of respondents change breathing circuit after infected or high- risk patient is attended to (Figure 6).

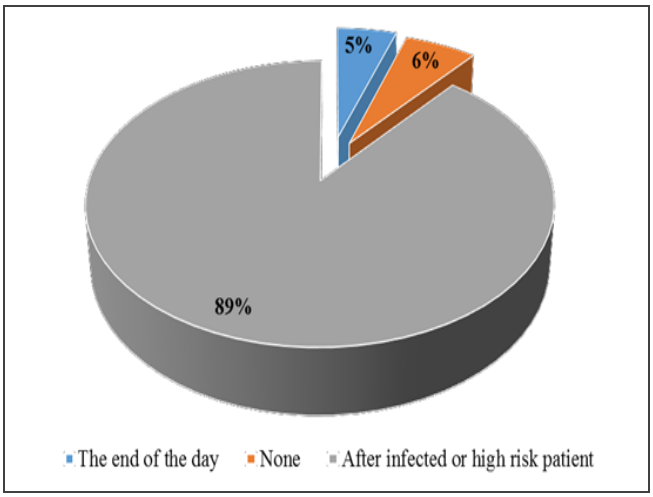

Figure 6: Changing of breathing circuit by anaesthesia practitioners

Drugs use and kept for re-use information is contained in Table 10 and results indicate majority of the drugs when opened, should be kept for re-use within 24 hours an evidenced by 91.7% of respondents reported for Propofol, 61.1% of respondents reported for Atropine,55.6% of respondents reported for Thiopental and 52.8% of respondents reporting for Succinylcholine.

Table 10: Safe injection practices and drug use by anaesthesia practitioners

Duration	Frequency (n)	Percent (%)
Propofol		
Within 24 hrs	33	91.7
Don't know	3	8.3
Thiopental		
Within 24 hrs	20	55.6
After 48 hrs	12	33.3
Don't know	4	11.1
Atropine		
Within 24 hrs	22	61.1
After 48 hrs	11	30.6
Don't know	3	8.3
Succinylcholine		
Within 24 hrs	19	52.8
After 48 hrs	12	33.3
Don't know	5	13.9

Majority of the respondents (89%) use new syringes to draw fraction of drug for use for a patient while 11%does not use new syringe (Figure.7). However, all (100%) of the respondents discard used syringes and needles in a sharp container.

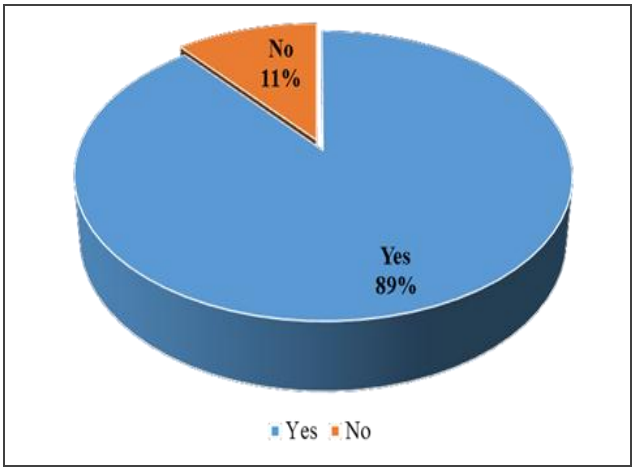

Figure 7: Use of new syringe to withdraw fraction of drug by anaesthesia practitioners

Discussions

Demographic characteristics of respondents indicate that majority of the respondents were male anaesthetists (83.3%) against female anaesthetists of 16.7%. More of the respondents (44.4%) were in the age group of 30-34years while 35-39years forms 33.3%. Majority of the respondents (61.1%) holds an advanced level diploma certificate while 38.9% holds a bachelor's degree certificates. Furthermore, half (50%) of the respondents had working experiences of 0-4 years while 38.9% had 5-9years working experience. Religious affiliation presented indicates that 55.6% of the respondents were Christians while 44.4% were Muslims.

Results from the study indicated that 83.3% of the respondents reported that a recommended infection prevention guideline is available while 16.7% responded in the negative. However, all respondents 100% have knowledge on infection prevention and control guidelines. The source of knowledge on infection prevention guidelines indicated that majority of the respondents 55.6% got the knowledge from attending training courses while 22.2% got it from their own research and oral communication. Infection prevention and control (IPC) guidelines(protocol) were reported to be readily available by 25%of the respondents whilst 75% reported in the negative. As to whether the guideline affects their scope of work positively, it was realized that the guideline affects 66.7% of the respondent's scope of work positively while 33.3% of the respondent's scope of work was not affected by the guideline. Respondents' adherence to IPC guideline indicated that 72.2% adhere strictly to IPC practices while 27.8% do not adhere to it strictly. This therefore means that anaesthetists at TTH have adequate knowledge on infection prevention control.

These findings corroborated with Adamasuet al, (2013) in Ethiopia and Yakob, Lamoro & Henok, (2015) which assessed infection control practices among hospital staff. This study also agreed with Sethi et al, (2012) in Uganda in which almost all healthcare workers had knowledge in infection prevention and again supported by Gould et al, (2010) in a systematic review which indicated a high knowledge of infection prevention among healthcare workers. However, the findings of this study were contrary to Paudyal et al, (2008) in Nepal which reported knowledge of infection prevention at 16% and Taneja et al, (2009) and Darawad& Al-Hussami, (2012) who reported 75.5% knowledge in a tertiary care hospital.

Findings from the study on attitude and practice are group into the following areas; personal hygiene, personal protective equipment, cleaning of anaesthesia equipment, skin preparations and safe injection practices.

Results on hand hygiene indicated that only 30% of the respondents reported alcohol hand gel is readily available at the operating theatres while 69% reported in negative. 78% of the respondents indicated that, water and soap are always available in the theatre for hand washing and 22% of respondents reported otherwise. 36.1% sometimes perform hand washing before and after each procedure while 63.9% always wash their hands before and after each procedure. On the other hand, only one respondent (2.8%) failed to wash hand when come into contact with patient, the rest 33.3% and 63.9% of respondents wash their hands sometimes and always respectively. Furthermore, 27 respondents reported they always wash their hands before and after regional block. But on observation, only 12 (33.3%) always wash their hands before and after regional block.

Findings on personal protective clothing's in regards to attitude and practice vary. The result from the study indicated that all (100%) of the anaesthetists change their clothing when leaving the operating theatre to their various homes. Again, majority (69.4%) of the respondents always change clothing on exit and re-entry into the operating theatre. Wearing of gloves had higher positive attitude and practice with a score of 100% followed by face mask which scored 36.1% and 63.9% respectively for sometimes and always. Wearing of goggles and sterile gowns had lowest score towards the attitude and practice on HAIs prevention control. Ranging from 69.4% to 91.7% of respondents do not wear sterile gowns when performing procedures such as extubation, intubation, regional anaesthesia, peripheral blocks etc. while ranging from 80.6% to 97.2% of respondents do not wear goggles when performing same procedures.

Cleaning of anaesthesia equipment is very important in infection prevention and control. From the study, it was noted that 66.7% of respondents' always clean anaesthesia equipment after procedure while 30.6% respondents sometimes clean but 2.8% respondents do not clean at all after the procedure. 91.7% respondents use 0.5% chlorine or spirit for cleaning of the anaesthesia equipment while 2.8% use only water for cleaning. 5.6% respondents do not know what is used in cleaning the anaesthesia equipment.

Attitude and practice on infection prevention and control among anaesthetists on skin preparation before a procedure according to the finding of this study was optimal. All 36(100%) respondents clean the skin twice with antiseptic such as savlon and spirit before undertaking procedures such regional and peripheral blocks.

Respondent's attitude and practice towards safe injection practices followed the standard on one side while the other did not follow the standard. 100% of the respondents discard used syringes and needles in sharp container whilst as low as only 13.9% do not recap used needles which is the standard.

This result concluded that infection control practices in the operating theatres at TTH were moderate. This can also be described as suboptimal levels of compliance with standard of infection control guideline.

This finding complied with the findings of general studies on HCW compliance with infection control policies in developed countries (Stein et al, 2003; Gammon et al, 2008; Gershon et al, 1996). Again, the findings from the study support the previous reports that HCWs are selective in their adherence to individual guidelines. Variations with individual infection control guidelines have been reported in many studies. For hand washing, compliance ranges from 27-86%, with a mean of 52% (Pittetet al, 1999). Regarding PPE, Gammon et al. reported that gloves, gown and goggles compliance rates were, on average 62% (range 11-98%), 57% (range 8-93%) and 38 (range 0-92%) respectively. Gammon et al also found the mean compliance rate for face mask to be 30 (4-55%).

Study Limitations

- The observational aspect of the data collection was time consuming and also the duration of the study is limited.
- Limited resources especially financial constraints were a very big challenge to the researchers making it impossible for the authors to extend the study to other facilities.
- Anaesthesia staffs' co-operation during the data collection was challenge due to their tight work schedules.

Conclusions

In conclusion, this study demonstrated that anaesthetists at the TTH have reported sub-optimal levels of compliance i.e. attitude and practice with selective infection control. The study further demonstrated that discrepancies exist between anaesthetists' attitude towards a guideline as well as their actual practice. This suggests that multiple factors play a role in determining an anaesthetist's behaviour which in turn might explain why compliance to infection control precautions are internationally sub-optimal.

Recommendations

- Infection control guidelines should be made available at the theatre so that anaesthetists and other health care workers in the department can have access to it and thereby comply with appropriate measures.
- Regular in-service training on IPC for anaesthesia staffs to update them on current infection prevention and control practices and the benefits of complying.
- Regular supply of 0.5% Chlorine solution and antiseptic to enable recommended cleaning of Anaesthesia equipment.
- Supportive supervision should frequently be carried out in the department to monitor the infection control practices of anaesthetists.

Data availability statement

The mixed quality and quantitative data used to formulate the conclusions of this study are all included in this manuscript

Source of Funding

The activities of this research were fully funded from monies contributed by the researchers. The authors did not receive any financial support from any institution or individual

Conflict of interest

We the authors of this research have no form of conflict of interest to declare

References

[1] Plowman, R., Graves, N., Griffin, M. A. S., Roberts, J. A., Swan, A. V., Cookson, B., & Taylor, L... The rate and cost of hospital-acquired infections occurring in patients admitted to selected specialties of a district general hospital in England and the national burden imposed. Journal of hospital infection 2001, 47(3), 198-209.

[2] WHO. (1981). Surveillance, Control and Prevention of hospital Acquired (Nosocomial) Infection Report of Advisory group/NIC.

[3] Bock Avalos S, K. O. (2010 June). Nosocomial Infection, Nursing. URL; http: // find articles.com//articles/miqa3689/is200411/ai n9471334.

[4] Anusha, S., Vijaya, L. D., Pallavi, K., Manna, P. K., Mohanta, G. P., &Manavalan, R... An epidemiological study of surgical wound infections in a surgical unit of tertiary care teaching hospital. Indian Journal of Pharmacy Practice 2010, 3(4).

[5] Mbim, E. N., Mboto, C. I., &Agbo, B. E... A Review of Nosocomial Infections in Sub- Saharan Africa. British Microbiology Research Journal 2016, 15, 1-11.

[6] Collins, A. S. (2008). Preventing health care–associated infections.

[7] Pittet, D., & Donaldson, L. Challenging the world: patient safety and health care-associated infection. International Journal for Quality in Health Care 2006, 18(1), 4-8.

[8] Kim, T., Oh, P. I., & Simor, A.E. The economic impact of methicillin-resistant Staphylococcus aureus in Canadian hospitals. Infection Control & Hospital Epidemiology 2001, 22(02), 99-104.

[9] Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Sauvan, V., Touveneau, S., & Perneger, T. V... Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. The Lance t 2000, 356(9238), 1307-1312.

[10] VINCat.Generalitat de Catalunya. (2010) OMS Nosocomial Infection; http://vincat.gen\cat.cat/en/professional_sanitaris/la_infeccio_nosocomial/ Accessed on 12th January, 2017

[11] Saka, M.J., Saka, A. O., & Adebara, V. O. Prevention of Nosocomial Infections in the new born: The practice of private health facilities in rural communities of Nigeria. International Infection Diseases 2011, 1,9.

[12] Jamison, D. T., Breman, J. G., Measham, A. R., Alleyne, G., Claeson, M., Evans, D. B., & Musgrove, P. (2006). Cost-effective strategies for the excess burden of disease in developing countries.

[13] Pellizzer, G., Mantoan, P., Timillero, L., Allegranzi, B., Fedeli, U.Schievano, E., & Spolaore, P..Prevalence and risk factors for nosocomial infections in hospitals of theVeneto region, north-eastern Italy. Infection 2008, 36(2), 112-119.

[14] Ocran, I., & Tagoe, D. N. A... Knowledge and attitude of healthcare workers and patients on healthcare associated infections in a regional hospital in Ghana. Asian Pacific Journal of Tropical Disease 2014, 4(2), 135-139.

[15] Amoran, O. E., &Onwube, O. O... Infection control and practice of standard precautions among healthcare workers in northern Nigeria. Journal of global infectious diseases 2013, 5(4), 156.

[16] Mbim, E. N., Mboto, C. I., &Agbo, B. E... A Review of Nosocomial Infections in Sub- Saharan Africa. British Microbiology Research Journal 2016, 15, 1-11.

[17] Adamasu, T., Stenehjem, E. A., Margoles, L., Kacha, E., Blumberg, H. M., &Kempker, R.R... Infection control knowledge, attitudes, and practices among healthcare workers in Addis Ababa, Ethiopia. Infection Control & Hospital Epidemiology 2013, 34(12), 1289-1296.

[18] Yakob, E., Lamoro, T., &Henok, A... Knowledge, attitudes and practice towards infection control measures among Mizan-Aman general hospital workers, South West Ethopia. J Community Med Health Educ 2015, 5(5), 1-8.

[19] Sethi, A. K., Acher, C. W., Kirenga, B., Mead, S., Donskey, C. J., &Katamba, A... Infection control knowledge, attitudes, and practices among healthcare workers at Mulago Hospital, Kampala, Uganda. Infection Control & Hospital Epidemiology 2012, 33(09), 917-923.

[20] Gould, D. J., Moralejo, D., Drey, N., &Chudleigh, J. H. (2010). Interventions to improve hand hygiene compliance in patient care. The Cochrane Library.

[21] Paudyal, P., Simkhada, P., & Bruce, J... Infection control knowledge, attitude, and practice among Nepalese health care workers. American journal of infection control 2008, 36(8), 595-597.

[22] Darawad, M. W., & Al-Hussami, M... Jordanian nursing students' knowledge of, attitudes towards, and compliance with infection control precautions. Nurse education today 2013, 33(6), 580-583.

[23] Taneja, N., Chatterjee, S. S., Singh, M., Singh, S., & Sharma, M. (2010). Pediatric urinary tract infections in a tertiary care center from north India.

[24] McGaw, C. D., Tennant, I., Harding, H. E., Cawich, S. O., Crandon, I. W., & Walters, C. A... Healthcare workers' attitudes to and compliance with infection control guidelines in the operating department at the university hospital of the West Indies, Jamaica. International Journal of Infection Control 2012, 8(3).

[25] Pittet D, Mourouga P, Perneger TV, and the Members of the Infection Control Program. Compliance with handwashing in a teaching hospital. Ann Intern Med 1999; 130: 126-130

[26] Gammon, J., Morgan-Samuel, H., & Gould, D... A review of the evidence for suboptimal compliance of healthcare practitioners to standard/universal infection control precautions. Journal of clinical nursing 2008, 17(2), 157-167.