

# Assessment of Nurses' Knowledge in the Implementation of the Principles of Asepsis in the Hospital Environment

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**How to cite this paper:** Gasaba, E., Niyonkuru, V., Bugingo, L.B., Zimurinda, T., Bimenyimana, F., Ntirabampa, J.N., Ndikumana, M., Ntiranyibagira, B., Manirambona, E. and Sindayigaya, N. (2022) Assessment of Nurses' Knowledge in the Implementation of the Principles of Asepsis in the Hospital Environment. *Open Journal of Nursing*, 12, 842-853.

<https://doi.org/10.4236/ojn.2022.1212059>

**Received:** October 11, 2022

**Accepted:** December 26, 2022

**Published:** December 29, 2022

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## Abstract

**Introduction:** Aseptic procedures are undertaken by nurses in the general ward. The lack of nurse's aseptic techniques in clinical setting result to patients or healthcare expositions to hospital-acquired infections which are most of the time caused by lack of knowledge or ignorance of implementing the principles of aseptic technique. This study aims to assess nurses' knowledge and the possible barriers in the implementation of the principles of asepsis in healthcare setting. **Methods:** A cross-sectional study design was used to assess the nurses' knowledge and the possible barriers for implementing principles of asepsis in healthcare setting among. The study was carried out at Clinique Van Norm (CVN), a free Methodist Church related institution located in the north District of Bujumbura city in Burundi, from October to November, 2021 among nurses who work within three services of the clinic (Gynecology and Obstetrics, Pediatric and Operating room). A convenience sampling method was used to invite all nurses (44) working in the 3 services of CVN to participate in our study. A self-report method involving questionnaire completion with three components addressing demographic data, participants' knowledge and barriers to implement the principles of asepsis was used to collect data which were later on analyzed by SPSS version 21. **Results:** Research findings show a significant participant's poor knowledge on principles of asepsis in the hospital as for almost variables used to assess their knowledge, they scored less than 50% except for the time of using sterile gloves in which most of the participants (71.4%) said that they do use sterile gloves when indwelling urinary catheters, labor and delivery, newborn care, wound dressing or suturing, or any time handling aseptic equipment, inserting nasogastric feeding tube... In addition, participants argued that they know the

principles of asepsis (57.1%), however, only 14.3% of them were able to list at least 5 of the principles of asepsis. Finally, all our participants (100%) confirmed that there are no infection control programs in their hospital, neither an infection control protocol in their service which was evident as none of them wasn't familiar with the contents of infection control protocol. Financial constraints, workload, lack of materials and ignorance of nurses were the most barriers to implement principles of asepsis in their service. **Conclusion:** This study shows a poor knowledge among nurses at CVN regarding the implementation of the principles of asepsis. Financial constraints, workload, lack of materials and ignorance of nurses were the most barriers that hinder the implementation of principles of asepsis in their service. Continuing professional development program and curriculum revision were highly recommended to overcome this problem.

### Keywords

Asepsis, Principles of Asepsis, Nurses, Knowledge

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## 1. Introduction

Nursing practice includes nursing procedures that aim to restore the patient's health. This includes guidelines based on nursing theories, healthcare professionals' expertise, the work schedule and the work organization in healthcare institutions oriented by the rules of asepsis [1].

Aseptic technique is a process or procedure used to achieve asepsis for preventing the transfer of potentially pathogenic micro-organisms to a susceptible site that may result in the development of infection [2]. Once in clinical setting, if nurse's aseptic techniques are not respected, this could result to patients or healthcare expositions to hospital-acquired infections. Patients hospitalized with sepsis are eight times more likely to die during hospitalization [3]. Aseptic procedures are undertaken by nurses in the general ward setting; however, several studies indicate that the principles of aseptic technique are not well understood or neglected to be implemented in daily nursing practice [4].

To reduce patients' risk of developing hospital-acquired infections, it is important to prevent the transmission of micro-organisms between staff and patients when undertaking any invasive procedure; which can be achieved by asepsis [5]. The term asepsis means the absence of potentially pathogenic micro-organisms. We might say that the understanding and application of the principles of asepsis reflect with the era of Florence Nightingale, who made the links between good hand hygiene, environment and reduction in wound infections in 1855 [5] [6].

According to WHO, no one should catch an infection while receiving health care, however, these infections can spread through outbreaks and many regular care practices, affecting hundreds of millions of people across the world every year to be harmed by these preventable infections and as a result of antimicrobi-

al resistance [7]. In United States, sepsis was considered as a life-threatening and a medical emergency; the incidence of sepsis continues to steadily increase and it was approaching 800,000 cases per year in 2005 with more than 17 billion dollars in direct healthcare expenditures [8]. In UK, around 44,100 deaths per year are attributable to sepsis, which cost the NHS a projected of £7.76 billion [9].

In India, WHO (2008) reports that 50% - 60% of all neonatal death occur within the first month of life due to poor aseptic technique practicing in the labor room, while more than half could die during the first week of life [10].

Study conducted in Rwanda for predicting mortality in low-Income country ICUs by validating Rwanda Mortality Probability Model (R-MPM) revealed that 42.2% of the patients admitted within 24 hours had a diagnosis of sepsis, while 33.0% had severe sepsis, and 20.8% septic shock [11].

In Burundi, we find that there was no study done on this matters for assessing the effectiveness of using principals of asepsis in the hospital environment. Our study focused on the assessment of nurses' knowledge and possible barriers in the implementation of the principles of asepsis because there are the ones who often assess and spend most of the time with patients by providing nursing care which need aseptic technique. Our study aims to contribute to the promotion of nursing care in the hospitals by respecting the principles of asepsis.

## 2. Theoretical Framework

In 1945, Nightingale and her nurses arrived at the military hospital in Scutari and found soldiers wounded and dying amid horrifying sanitary conditions which were rampant infection [12]. She, therefore, changes the hospital environment by cleaning it and improves patients' care even though medicines and other essentials were in short supply within a neglected hygiene condition. She provided clean shirts, soap, plates, knives, and forks, cups and glasses to patients. She believes that environment hygiene and asepsis technique were essential while taking care for these patients. By adopting F. Nightingale principles of sepsis, nurses and all healthcare provide might prevent and control healthcare associated infection in all healthcare setting which could improve patient outcomes, save the cost and hospital stays.

## 3. Methods

This study was carried out at Clinique Van Norm, which is a free Methodist Church related institution located in the north District of Bujumbura city, in Ngagara-Burundi, from October to November, 2021 among nurses who work within three services of the clinic (Gynecology and Obstetrics, Pediatric and Operating Room). A cross-sectional study was used to assess the nurses' knowledge and the possible barriers for implementing principles of asepsis in healthcare setting. The purpose of our study is to contribute to the promotion of nursing care in the hospitals by respecting the principles of asepsis. In addition to its patient care, Van Norman clinic is an essential part of Hope Africa University's

medical training program for increasing the number of African doctors and nurses. Therefore, CVN counts 55 nurses, within 49 nurses work in Gynecology and Obstetrics, Pediatric and Operating room (23, 17, 9 respectively). All nurses working full or part-time were included in the study, while trainees' nurses and those who were on leave or sick were not included. These above services were selected because they the most service that count most of the nurses. Additionally, according to the clinic organization, we found that the pediatric unit is combined with nurses of neonatal service, while surgery unit to combine nurses who work in operating room and surgery unit. A convenience sampling method was used to invite all nurses (44) working in the 3 services to participate in our study (N equal to simple size:  $N = 44$ ). A self-report method involving questionnaire completion with three components addressing demographic data, participants' knowledge and barriers to implement the principles of asepsis was used to collect data. It was presented in French and in English. Participants had used a French questionnaire as this is the language of professionals used in Burundi. The data collection tool was designed by the authors after reviewing the related literatures. A Statistical Package for Social Scientists version 21.0 software (SPSS) was used to analyze the data which were presented as a frequency table, pie charts, and bar graphs. The score of the results were classified refer to the items' scored by participants in each section of variables. It was good/high for those who scored more than 50%, poor/low for those who scored less than 50% for the items of the questionnaire. Ethical principles had been respected where an informed consent form was attached to the questionnaire, participants were given a choice whether to participate in the survey or not and the authorization to carry out the study was required from Hope Africa University and CVN Superintendent.

#### 4. Results

During our study, the findings revealed that majority of the participants were female (57.1%) while (42.9%) were male, ratio 1.3. Their age ranged from 21 - 47 years ( $\bar{x} = 33.8$  years). Most of the participants (32.7%) had 1 to 4 years on service, while 30.6% had 8 - 10 years, 20.4%, less than one year and 16.3% 5 to 10 years. Majority of the participants (46.9%) were in Gynecology and Obstetrics unity, 34.7% and 18.4% in Pediatric and in Operating Room (OR) respectively. Finally, majority of the participant had a vocational secondary school (49.0%), while 40.8% and 10.2% had respectively a bachelor degree and masters' degree (**Table 1**).

Nurse's Knowledge on the principles of asepsis in the hospital

The current study shows a significant participant's poor knowledge on principles of asepsis in the hospital as for almost variables used to assess their knowledge, they scored less than 50% except for the time of using sterile gloves. Most of the participants (71.4%) said that they do use sterile gloves when indwelling urinary catheters, labor and delivery, newborn care, wound dressing or suturing,

**Table 1.** Demographic data.

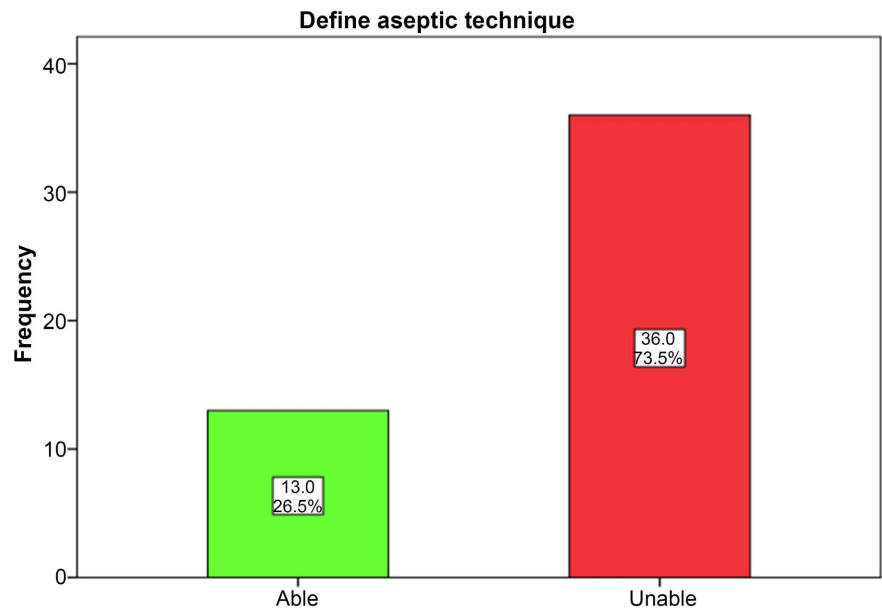
Characteristics	Frequency (N = 49)
Age	
Range	21 - 47 Years
Mean	33.8 Years
Sex	
Male	21 (42.9%)
Female	28 (57.1%)
Length of time on your unit	
less than one Year	10 (20.4%)
1 - 4 Years	16 (32.7%)
5 - 10 Years	8 (16.3%)
8 - 10 years	15 (30.6%)
Department	
Gynecology and Obstetric	23 (46.9%)
Operating Room	9 (18.4%)
Pediatric	17 (34.7%)
Education Level	
A2 Diploma	20 (40.8%)
BSN	24 (49.0%)
MSN	5 (10.2%)

or any time handling aseptic equipment, inserting nasogastric feeding tube..., while 28.6% wasn't able to give the right time of using sterile gloves (**Table 2**). Only 26.5% of participants were able to define what is aseptic technique, while 73.5% did not (**Figure 1**). Majority of the participants (57.1%) argued that they know the principles of asepsis (**Figure 2**), however, only 14.3% of them were able to list at least 5 of the principles of asepsis (**Table 2**). Only 26.5% of the participants were able to give correctly the good practices for aseptic technique and the components of asepsis. Finally, 36.7% were able to give the reasons why nurses should maintain asepsis as healthcare providers (**Table 2**) such as "*protecting patient from bacteria, protection of hospital-acquired infection for both patients and healthcare providers, protect sterile equipment or instrument during medical procedure*".

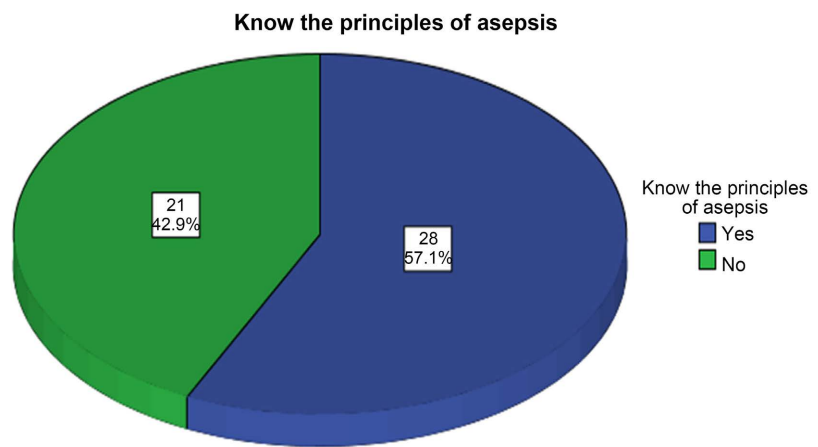
Barriers to implement the principles of asepsis

All our participants (100%) argued that there are no infection control programs in their hospital, neither an infection control protocol in their service which is evident that none of them wasn't familiar with the contents of infection control protocol (**Figure 3**). Majority of our participants said that financial constraints was the most barrier to implement principles of asepsis in their service, while 75.5% argued that workload, 71.4% lack of materials were the most barriers. However, only few of them (10.2%) argued that ignorance of nurses was the most barrier to implement principles of asepsis in their service (**Figure 4**).

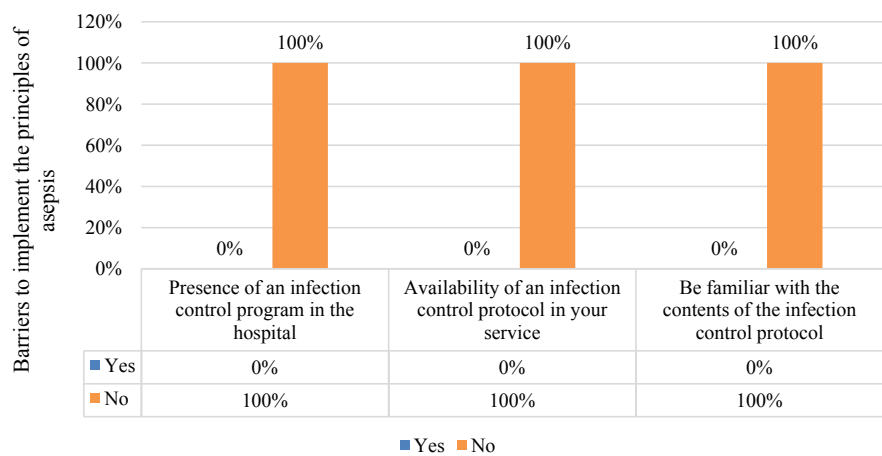
Most barriers to implement principles of asepsis in your service



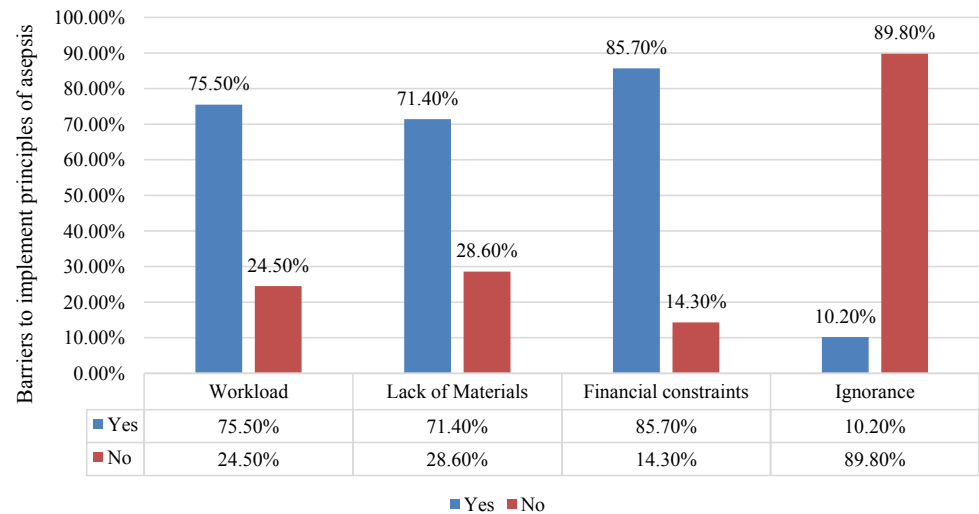
**Figure 1.** Distribution of participants' knowledge on their ability to define aseptic technique.



**Figure 2.** Participants who know the principles of asepsis.



**Figure 3.** Barriers to implement principals of asepsis in the hospital.



**Figure 4.** Most barriers to implement principles of asepsis in the service.

**Table 2.** Knowledge of participants on the principles of asepsis in hospital environment.

Characteristics	Frequency (N = 49)
List at least 5 of the principles of asepsis	
Able	7 (14.3%)
Unable	42 (85.7%)
Good practices for aseptic technique	
Able	13 (26.5%)
Unable	36 (73.5%)
When to use sterile gloves	
Able	35 (71.4%)
Unable	14 (28.6%)
Components of asepsis	
Able	13 (26.5%)
Unable	36 (73.5%)
Reasons to maintain asepsis as healthcare providers	
Able	18 (36.7%)
Unable	31 (63.3%)

The Bivariate Pearson correlation revealed a significant strong positive correlation between the participants' knowledge and their education level ( $r = 0.830$ ;  $p = 0.000$ ) and their gender ( $r = 0.804$ ;  $p = 0.000$ ) (**Table 3**).

## 5. Discussion

Aseptic technique is a core competency for every nurse which is required for our everyday nursing procedures such as catheterization, wound dressing or suturing, labor and delivery, or any time patients undergo with invasive devices [5].

The current study revealed that majority of our participants were female (57.1%) while 42.9% were male, ratio 1.3. Their age ranged from 21 - 47 years ( $\bar{x} = 33.8$  years). This contract the findings of Niyongabo, *et al.*, (2022) on the

**Table 3.** Correlations of the participants' knowledge vs their demographic data.

		Sex	Education level	Knowledge
Sex	Pearson Correlation	1	0.867**	0.830**
	Sig. (2-tailed)		0.000	0.000
	N	49	49	49
Education level	Pearson Correlation	0.867**	1	0.804**
	Sig. (2-tailed)	0.000		0.000
	N	49	49	49
Knowledge	Pearson Correlation	0.830**	0.804**	1
	Sig. (2-tailed)	0.000	0.000	
	N	49	49	49

\*\* . Correlation is significant at the 0.01 level (2-tailed).

assessment of nurse's knowledge, attitude and practice regarding PU prevention and treatment at Clinique Prince Louis Rwagasore which revealed that 92% of the participants were female [13]. This could be explained by the fact that CVN was recently opened in August 2012 compared to Clinique Prince Louis Rwagasore (1945) and had recruited the young generation of nurses, where we found also a significant number of male nurses in the contemporary nursing training compare to the beginning of nursing profession. Most of the participants (32.7%) had 1 to 4 years on service, while 30.6% had 8 - 10 years, 20.4%, less than one year and 16.3% 5 to 10 years. This could be explained by the above reason of this young institution of 10 years old right now, which still have the former employees and seems to be recruiting more nurses. Majority of the participants (46.9%) were in Gynecology and Obstetrics unity, 34.7% and 18.4% in Pediatric and in Operating Room (OR) respectively; most of the participant had a vocational secondary school (49.0%), while 40.8% and 10.2% had respectively a bachelor degree and masters' degree (Table 1).

The current study shows a significant participant's poor knowledge on principles of asepsis in the hospital as for almost variables used to assess their knowledge, they scored less than 50% except for the time of using sterile gloves. According to Labrague *et al.*, (2012), theoretical knowledge on principles of sterile technique is necessary to provide safe and effective nursing care to patient [14]. Most of the participants (71.4%) said that they do use sterile gloves when indwelling urinary catheters, labor and delivery, newborn care, wound dressing or suturing, or any time handling aseptic equipment, inserting nasogastric feeding tube... This concurs the findings of Tambe, Nkfusai, Nsai, and Cumber, (2019) whose findings revealed that 80% of the participants could confirm that they averagely maintained the aseptic techniques while 20% could strictly follow it [15].

Only 26.5% of participants were able to define what is aseptic technique (Figure 1), while majority of them (57.1%) argued that they know the principles



of asepsis (Figure 2). Nevertheless, only 14.3% of the participants were able to list at least 5 of the principles of asepsis (Table 2). This could be explained by lack of in-service training or continuous professional development. This finding is in line with the survey done to explore the understanding of the principles of aseptic technique in which nurses' understanding of aseptic technique was inadequate; this might put the patients at risk of getting nosocomial infection [4]. According to the Australian Commission on Safety and Quality in Health Care (2021), there five major principles of asepsis technique that every nurse should take note during nursing procedures, these are sequencing for patient and healthcare worker's safety risk assessment, clinical environmental control, hand hygiene, maintenance of aseptic field and personal protective equipment (PPE) [16].

Only 26.5% of the participants were able to give correctly the good practices for aseptic technique and the components of asepsis, this contracts the findings of the study conducted in India on nurses' knowledge regarding aseptic technique in the operation theatre of selected hospitals of Bharatpur which revealed that more than half of the respondents had high knowledge on aseptic technique [17]. The poor knowledge of nurses on the practices for aseptic technique and its components could be explained by the fact the current study revealed that all the participants (100%) argued that there is no infection control program in their hospital, neither an infection control protocol in their service which is evident as none of them wasn't familiar with the contents of infection control protocol (Figure 3). This is very danger for the patients' and healthcare safety as there will be a great risk of healthcare-associated infections due to lack of the program and clinical protocol. This simply means that there is no program for nurses' development or any workshop regarding the implementation of aseptic technique and healthcare do use their empirical knowledge of what they have learned throughout their nursing training. Moreover, 36.7% were able to give the reasons why nurses should maintain asepsis as healthcare providers (Table 2) such as "*protecting patient from bacteria, protection of hospital-acquired infection for both patients and healthcare providers, protect sterile equipment or instrument during medical procedure*". Normally, asepsis technique helps nurses to protect patients from infection; therefore, this lack of participants knowledge could expose patients to healthcare-associated infection. Continuing professional development could be conducted at CVN for the purpose of upgrading nurses' knowledge on principles and technique of asepsis. Majority of our participants said that financial constraints was the most barrier to implement principles of asepsis in their service, while 75.5% argued that workload, 71.4% lack of materials were the most barriers. However, only few of them (10.2%) argued that ignorance of nurses was the most barrier to implement principles of asepsis in their service (Figure 4). This is in line with a study conducted in Bamenda Regional Hospital of Cameroon where the findings show that the main barriers to implement aseptic techniques by nurses were patient's financial constraints and inadequate supply of dressing materials [15]. Study conducted in Bamenda Health

District of Cameroon to determine the availability of resources for infection prevention and control and health promotion among healthcare providers found that there was significant lack of knowledge which was associated with negligence of the staff due to inadequacy or complete absence of basic equipment and supplies and lack of irregular supervision and demotivation of staff [18]. The Bivariate Pearson correlation revealed a significant strong positive correlation between the participants' knowledge and their education level ( $r = 0.830$ ;  $p = 0.000$ ) and their gender ( $r = 0.804$ ;  $p = 0.000$ ) (Table 3). This could be explained by the above reasons as majority of the participant had a vocational secondary school (49.0%), while the gender could influence it due to their personal and familyhood activities as most of our participants were female. Therefore, in service training or continuing professional development program could be set by the hospital management to upgrade their employees' knowledge on principles and practices of aseptic technique.

## 6. Recommendation

The following are the recommendations that emanated from the study:

- 1) The CVN management should organize a continuing professional development program for the purpose of upgrading nurses' knowledge on the principal of asepsis, meanwhile infection control program and infection control protocol should do be adopted in this institution,
- 2) Universities' institutions should revise their curriculum on the importance and use of asepsis technique,
- 3) Further research should be conducted on the prevalence and socio-economic impact of asepsis on patients in Burundi.

## 7. Conclusion

In short, the current study revealed a poor knowledge among participants as for almost variables used to assess their knowledge, they scored less than 50% except for the time of using sterile gloves. Lack of infection control program in their hospital and the absence of an infection control protocol in their service, along with financial constraints, workload and lack of materials were the most barriers encountering by all participants for implementing asepsis technique. Lastly, participant's gender and education level were statistically correlated with their knowledge on the principal of asepsis ( $p = 0.000$ ). Continuing professional development and curriculum revision were highly recommended by authors.

## Limitation

This study has some limitations. The study was done in one hospital with a small population and the author did not test the questionnaire's validity or reliability.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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