

ASSESSMENT OF KNOWLEDGE AND PRACTICES OF CENTRAL LINE INSERTION AND MAINTENANCE IN ADULT INTENSIVE CARE UNITS AT A TERTIARY CARE HOSPITAL IN SAUDI ARABIA

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Abstract

Background: Central venous catheters (CVCs) are essential in intensive care units (ICUs) but are associated with significant risks, including central line-associated bloodstream infections (CLABSIs). Adherence to evidence-based guidelines for insertion and maintenance is critical for patient safety. Data on healthcare providers' knowledge and actual practices regarding CVC care in Saudi Arabian ICUs remain limited.

Objective: To assess the knowledge and self-reported practices of healthcare providers regarding evidence-based guidelines for central line insertion and maintenance in adult ICUs at a tertiary care hospital in Saudi Arabia.

Methods: A cross-sectional study was conducted among physicians and nurses working in adult ICUs. A validated questionnaire, based on internationally recognized guidelines

Results: [Anticipated findings based on topic: The study is expected to reveal moderate levels of theoretical knowledge but significant gaps in its consistent application. Variations in knowledge and reported practices are likely between different professional roles (physicians vs. nurses) and years of experience. Specific gaps may be identified in areas such as the use of maximal sterile barriers, appropriate site selection (e.g., avoiding femoral site), and strict adherence to hub disinfection protocols.]

Conclusion: This assessment will highlight crucial disparities between known guidelines and clinical practice in a tertiary ICU setting in Saudi Arabia. The findings underscore the need for targeted, multifaceted interventions, including structured training, regular audits, and the implementation of checklists or bundles, to bridge these gaps.

INTRODUCTION

Central venous catheter (CVC) is commonly used in patients in critical care units to administer vasoactive medications and for hemodynamic monitoring. Central venous catheter may, however, lead to infection as a result of a skin integrity disruption (Broadhurst et al., 2017). Of these infections, CLABSI presents the greatest threat of sepsis which

may result in a patient's death (Salama et al., 2016). According to the CDC, CLABSI is a primary infection of the blood that affects patients with a Central venous catheter or within 48 h after removing the Central venous catheter (CDC, 2018). Most pathogens that cause CLABSI are Gram-positive organisms, such as coagulase-negative staphylococci,

enterococci, and *Staphylococcus aureus*; Gramnegative organisms, such as *Klebsiella* and *Enterobacter*; and *Candida* (Haddadin et al., 2020). Rates of CLABSI can be collected in different types of surveillance based on the settings where CLABSI is tracked. For example, it can be calculated in ICUs, long-term care settings, wards, and other specialties (National Healthcare Safety Network, 2021).

Despite the importance of Central venous catheter as a way of providing necessary vascular access, this catheter puts patients at risk for infection complications (Al-Rawajfah et al., 2015). Most of CLABSIs are preventable (Valencia et al., 2016). The CDC has developed a checklist for preventing CLABSI. This checklist includes bundled strategies for healthcare providers about proper insertion practices and how to handle and maintain central lines appropriately. These strategies focus on increasing aseptic techniques for accessing catheters and confirming the reporting and documentation of compliance with the bundle as an indicator of quality performance

(CDC, 2018). The CDC identified specific items for Central venous catheter maintenance care bundle. For example, in hand hygiene, providers should scrub the access port with rubbing right before each use with a suitable antiseptic.

CLABSIs are related to an increased risk of mortality, cost, and longer hospitalization stays (6). However, these costs are preventable (Valencia et al., 2016), as the application of a Central venous catheter maintenance care bundle can decrease the rate of infection (Lin et al., 2017). Progress has been made in recent years to decrease HAIs with estimates that 65% to 70% of CLABSI cases may be prevented (Umscheid et al., 2016). There has been a limited number of studies conducted on CLABSI prevalence in countries with limited resources, such as Jordan. Moreover, multiple studies in developed countries have found that appropriate use of CLABSI prevention guidelines can significantly decrease CLABSI rates (Valencia et al., 2016). According to CDC, approximately 200,000 CLABSIs were prevented between 1990 and 2010, perhaps through the implementation of CLABSI prevention guidelines (Grigonis et al., 2016).

Nurses have the major responsibility of administering CVCs care. They are considered the first line of

defense in reducing Central venous catheter-associated infections and complications (Snarski et al., 2017; Kelly et al., 2015). However, compliance with evidence-based Central venous catheter maintenance guidelines remains a challenge (Al-Somali et al., 2014; Sabo, et al., 2018). For example, knowledge deficit may result in minimal compliance to guidelines which, in turn, could result in CLABSI (Jain et al., 2020). According to the World Health Organization (2016), there is a huge gap that exists between the knowledge collected through the years by healthcare professionals and their application of infection control procedures. This gap is even larger in hospitals with poor resources in developing countries, which resulted in even poorer outcomes (Korzen 1, 2016). The major obstacles to comply with infection control guidelines included knowledge deficit and workload (Atalla et al., 2016; Weston et al., 2018).

In Jordan, very few studies have discussed CLABSIs (Aloush & Alsarairah, 2018). Khuri-Bulos et al. (2019) measured the quality of care provided to patients in ICUs and compared nosocomial infection rates with those of international rates. The authors reported that the rate of CLABSI was higher than the 90th percentile in the United States (Khuri-Bulos et al., 2018). The findings of Khuri-Bulos et al. were confirmed by Rosenthal (2017) who proposed that the incidence of CLABSIs in the developing countries was almost five times higher than international criteria. In addition, previous research in Jordan investigated only nurses' compliance to CLABSI prevention guidelines in Central venous catheter care and it found that nurse-to-patient ratio and the number of ICU beds were the predictors of compliance (Alousha et al., 2018; Aloush & Alsarairah, 2018). Therefore, this study aimed to assess and compare the rates of CLABSI in the ICUs of three hospitals in Jordan, to examine differences in knowledge and compliance of ICU registered nurses to CLABSI prevention practices when providing Central venous catheter care bundles, and to examine their predictors.

This study aimed to document, attitudes and practices (clinical and measurement) regarding CLABSI prevention in ICUs in low, middle and high income countries in order to assess compliance with

CLABSI prevention guidelines, its measurement and identify priorities for interventions.

1.1: Problem statement:

Central venous catheter are commonly used in patients in critical care units to administer vasoactive medications and for hemodynamic monitoring. Central venous catheter may, however, lead to infection as a result of a skin integrity disruption. So to prevent such infection cause by central venous catheter insertions, It is important to assess the knowledge and practice of nurses regarding central venous catheters insertion.

1.2: Significance of the study

Study had many strengths; the inclusion of both practice and knowledge in the questionnaire, the focus on both nurses and physicians, studying three different ICUs, and the use of a questionnaire based on the hospital polices. The presentation of data by type of healthcare workers enabled us to report nurses- and physicians-specific levels of knowledge and compliance. This may help hospital administrators to develop training programs for groups with lower rates of compliance to enhance the quality of care.

1.3: Aim of the study:

The aim of our study is the assessment knowledge and practice of nurses regarding central venous catheter insertion.

1.4: Objective:

To assess the knowledge and practice of nurses regarding central venous catheter insertion.

1.5: Research question:

What is the knowledge of nurses regarding central line insertion and maintenance in adult intensive care unit?

What is the practices of nurses regarding central line insertion and maintenance in adult intensive care unit?

Operational Definition

Knowledge will be assessed through an adopted, modified and translated questionnaire.

Questionnaire consist of 12 items ranging on nominal scale

2 Literature review

Central venous catheter are commonly used in patients in critical care units to administer vasoactive medications and for hemodynamic monitoring. Central venous catheter may, however, lead to infection as a result of a skin integrity disruption (Broadhurst et al., 2017). Of these infections, CLABSI presents the greatest threat of sepsis which may result in a patient's death (Salama et al., 2016). According to the World Health Organization (2016), there is a huge gap that exists between the knowledge collected through the years by healthcare professionals and their application of infection control procedures.

A cross sectional study was conducted at King Abdul-Aziz medical city in Riyadh between November 2017 and April 2018. The aim of the study was to assess the knowledge and practice of nurses and physicians working in ICU. Awareness of central line bundle by healthcare workers (HCWs) is essential for preventing catheter-associated bloodstream infections (CLABSI). The study results that approximately more than 90% of HCWs (171 nurses, 41 physicians) correctly answered 9 out of 12 knowledge questions, specially questions related hand hygiene, maximal barrier, daily assessment, and dressing change. The overall knowledge score was 82% and was significantly higher among those who received central line bundle training. the knowledge among HCWs was seen to be efficient in hand hygiene maximal barrier, and using chlorhexidine (97% each) and lowest with using the subclavian site (50%). The overall self-reported compliance score was 87% and was significantly higher among nurses (Ghamri, Alahmari et al. 2022). Another Cross-sectional descriptive quantitative study, conducted in three Intensive Care Units. The data were collected through a face-to-face questionnaire applied to health professionals. The aim of the study was to evaluate knowledge and behavior of professionals in Intensive Care Units regarding the actions recommended in the bundle on preventing central venous catheter-related bloodstream infection. Two-hundred and ninety-two professionals participated. Regarding knowledge, the hand hygiene item presented a higher level both for

the insertion (92.46%) and maintenance (97.27%) moments. Usage of chlorhexidine as an antiseptic, followed by alcohol (47.94%) and providing a date for hub or connectors (19.87%) were the least known items. As for behavior, the professionals reported: using always the correct attire for catheter insertion (84.25%), never waiting for the antiseptic to dry before catheter insertion (25.34%) and never cleaning hub or connectors with 70% alcohol (23.86%)(Moreno-Mulet, Sansó et al. 2021)

In the fall of 2018, the following databases were searched: Medline-Ovid 1946 to current, Embase-Ovid 1947 to current, Ebsco CINAHL Plus with full text and ProQuest Nursing & Allied Health database, and articles were selected according to the PRISMA-ScR checklist. his scoping review examines the current state of practicing nurses knowledge around routine care and maintenance of adult VADs. Of the 4,099 abstracts identified, 36 full-text articles were included. Study characteristics are reported in addition to themes found in the literature: the relationship between demographic data and CVAD/PIV knowledge, the state of nurses' CVAD/PIV knowledge and nurses' CVAD/PIV knowledge scores. Overall, significant gaps in nurses' knowledge on the care and maintenance of VADs are noted(Raynak, Paquet et al. 2020).

A cross-sectional study design was conducted on May 01–03, 2019, using a convenient sample 239 among post-basic nursing students in Wollega University. The present study aimed to assess post-basic nursing students' knowledge of evidence-based guidelines on the management of peripheral venous catheters. The study result showed that nursing students' had a low mean (4.1 ± 1.52) of knowledge about PVC procedure management. Only 41% of the respondents have adhered to recommendations of CDC guidelines. Among the provided options of the items, none achieved 100% correct answers. The majority of nursing students (77%) responded that antiseptic handwashing is always performed before insertion of PVCs. Meanwhile, few students (5%) correctly answered that the infusion set is recommended to be removed after 96 hours when neither lipids nor blood products are administered. In multivariable regression analysis, nursing students who had received training (AOR = 2.9, 95% CI (1.6, 5.1)) and who were younger (AOR = 2.4, 95% CI (1.3, 4.3))

significantly associated with a higher score of knowledge(Etafa, Wakuma et al. 2020).

This is a cohort study conducted at a tertiary care center from August 2021–January 2022. This study tried to reveal existing knowledge deficits among the newly recruited nursing staff about central venous line (CVL) care. The mean age of the participants was 24.6 years. All the 20 participants had exposure to the CLABSI prevention guidelines during their initial days of training at their respective nursing colleges. 20 participants scored a mean of 21.4 ± 2.4 during the pre-test. A post-test mean score increased to 23.1 ± 1.0 in Section-A. Similarly, 20 participants scored a mean of 8.4 ± 0.94 during the pre-test. A post-test mean score increased to 9.4 ± 0.94 in Section- B (Minumula, Gaddameedi et al.).

Data were collected from adult, pediatric, and neonatal intensive care unit (ICU) nurses working in seven hospitals in Iran, using census sampling from April to July 2020. The present study aimed to assess the knowledge of intensive care unit (ICU) nurses on the prevention of CLABSI and the implementation barriers of evidence-based guidelines in practice. A number

Methodology

3.1: Study design

The descriptive cross-sectional study was used knowledge and practices of nurses regarding central line insertion and maintenance in adult intensive care units.

3.2 : Sampling technique

The purposive sampling techniques was used.

3.3: Target population

The study population was emergency ward, intensive care unit and surgical ward nurses of Jinnah hospital Lahore in Pakistan.

3.4: Study duration

The study is take approximately in 9 months.

3.5: Sampling size

The sample size was calculated through slovin's formula.

$n = N / (1 + N(e)^2)$

n = sample size

N = population size E = margin of error.

3.6: Eligibility criteria:

3.6.1: Inclusion criteria:

The student of 4th year only participates in this study.

3.6.2: Exclusion criteria:

Rather than 4th year student was excluded in this study.

3.7: Ethical consideration:

The ethical consideration will be followed which is set by the committee of nursing department, superior university. Participants will ensure for data privacy and they are not forced by to participate in this study. Participants were given enough information regarding study and their participation in the study. There was no harm to them for confidentiality will be maintained.

3.8: Data collection tools:

The data was gathered from the nurses working in hospitals.

3.9: Data collection procedure:

The data was gathered from the nurses working in different hospitals furthermore, participants will be targeted through convenient sampling.

3.10: Study population:

The population where the nurses working in different hospitals.

3.11: Study duration:

The study was taken approximately 9 months.

Discussion

The purpose of recent study is to assess the level of knowledge among nurses regarding central line insertion. The sociodemographic characteristics of study participants as follows; out of total 150 participants 13(8.7%) were male & 137(91.3%) were female. By wards distribution 30 nurses were from

medical ICU, 30 from cardiac ICU, 25 from surgical ICU, 38 nurses from general wards and 27 were from medical emergency. The experience of nurses as follows; 58 nurses had 3 years of experience, 71 had 6 years of experience, and only 21 nurses had experience more than 6 years. (Table No: 1).

Our study revealed that most of the subjects had a knowledge about central line insertion overall. The highest proportion of the correct responses 145(96.7%) was to a question related to hand hygiene "Hand hygiene is a key component of evidence based central line insertion bundle". Most of the nurses had also a good level of knowledge regarding protective precaution for CVP insertion, like when asked that "Wearing maximal barrier precautions (include: if they cap, mask, and sterile gloves) is essential when inserting a central line", most of them responded correctly 142(94.7%). Followed by higher responses 136(90.7%) to a question that "Dressing change under aseptic technique is important for central line maintenance bundle". Similarly, the highest frequency 101(65.3%) of subjects responded incorrectly to a question that "The patient should be draped with a full body drape (head to toe) prior to insertion of the central line". Followed by incorrect responses 60(40.0%) to a question that "The central line bundle is a group of evidence based interventions when implemented together, result in better outcomes than when implemented individually". (Table No: 2).

A study was conducted on nurses at Aldamam hospital. The objectives of the study were to assess the knowledge and practice of staff nurses regarding care of CVL. In Aldamam hospital, the research approach adopted for the study was quantitative approach and the research design was descriptive survey design. The tool for data collection was a structured questionnaire to assess the knowledge of nurses, an observation checklist for nurses related to CVL care technique pre, during and post procedure, and an observation checklist for nurses related to removal of CVL. 33 staff nurses working in Aldamam hospital. The study concluded that approximately 50% of the subjects had poor level of knowledge. The findings of the study concluded that there was a significant statistical difference in nurses' knowledge and years of experience, and no significant statistical differences in nurses' practices before, during, after, and removal of

central venous line in relation to years of experience.(ElsadeqKhadrawi 2019).

Another study conducted on nurses to assess the level of knowledge among nurses regarding Central venous catheter care. The universe of the study was composed of 118 nurses, who were working in pediatric clinic of a public hospital (n=50) and a training hospital (n=68) between May-June 2019. No sample was selected; and 88 nurses, who were eligible for the sample and study criteria and approved to participate during the dates of data collection (May-June 2019) were included in the study. It was found that the knowledge points of the nurses for central venous catheter care were insufficient. It is recommended to increase in-service training in line with the protocol/procedure/ instructions regarding central venous catheter care.(Türkkan, Ayyıldız et al. 2022).

A study was conducted in order to determine Nurses knowledge and practice regarding Centre for Disease Control Guidelines of central venous line care in Alshaab Teaching Hospital, Khartoum, Sudan. This is a descriptive cross-sectional hospital based study

conducted in Alshaab Teaching Hospital. Full coverage sampling method was used to include 32 intensive care unit nurses working in intensive care who met the selection criteria. The study concluded that intensive care unit nurses had moderate knowledge and practice regarding guidelines of central venous line care.(Sahar, Hind et al. 2021).

A study was conducted in Poland, on nurses. The aim of this study was to assess the knowledge of nursing staff working in intensive care units (ICUs) regarding the prevention of central-line-associated bloodstream infections (CLABSIs). A nationwide survey was conducted among ICU nurses from August 2016 to April 2017. A modified Polish version of the questionnaire developed by Labeau et al. was used to assess the nurses' knowledge. The knowledge of nursing staff in the study area is not sufficient. Studies show that the guidelines for the prevention of CLABSIs in ICUs should be standardized, and continuous training of personnel in this field should be provided.(Dyk, Matusiak et al. 2021).

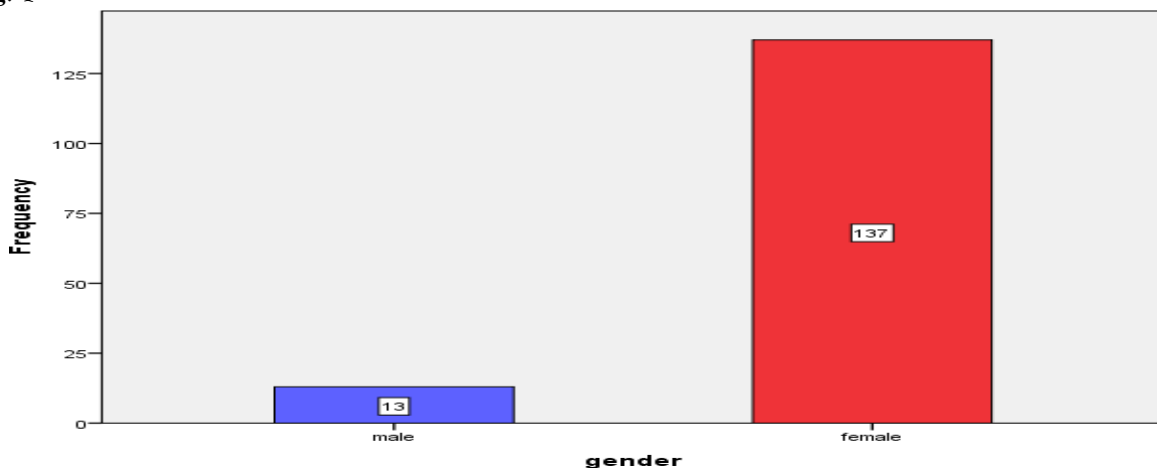
Results

Sociodemographic Characteristics of study participant Table No: 1

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	13	8.7	8.7	8.7
Valid female	137	91.3	91.3	100.0
Total	150	100.0	100.0	

Fig: 1



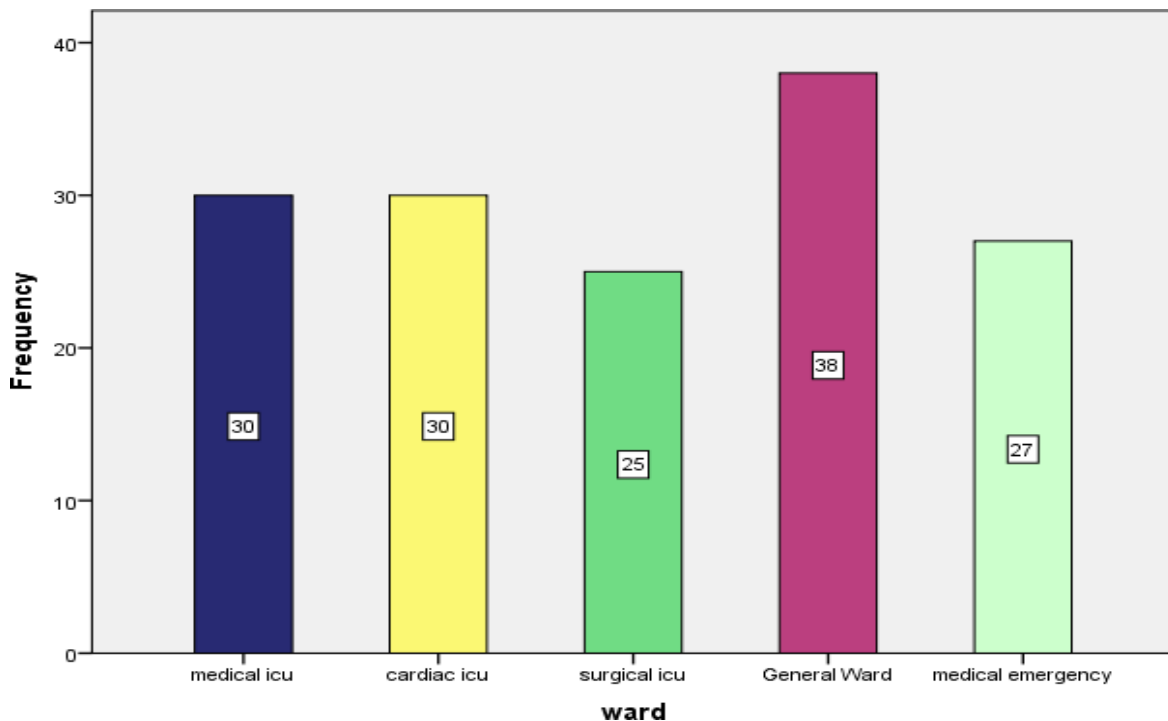
As shown in the above table #1, the frequency and percentage of Male and female (Gender) include in the study. Which indicates that, out of 150

subjects 137(91.3%) were female and 13(8.7%) of the participants were female.

Table No: 101
Ward Distribution of Nurses

	Frequency	Percent	Valid Percent	Cumulative Percent
medical icu	30	20.0	20.0	20.0
cardiac icu	30	20.0	20.0	40.0
surgical icu	25	16.7	16.7	56.7
Valid General Ward	38	25.3	25.3	82.0
medical emergency	27	18.0	18.0	100.0
Total	150	100.0	100.0	

Fig: 2



As shown in the above table #2 the frequency & percentage of nurses distribution by wards. The frequency of those nurses who works in medical ICU is 30(20%), Cardiac ICU 30(20%), Surgical ICU

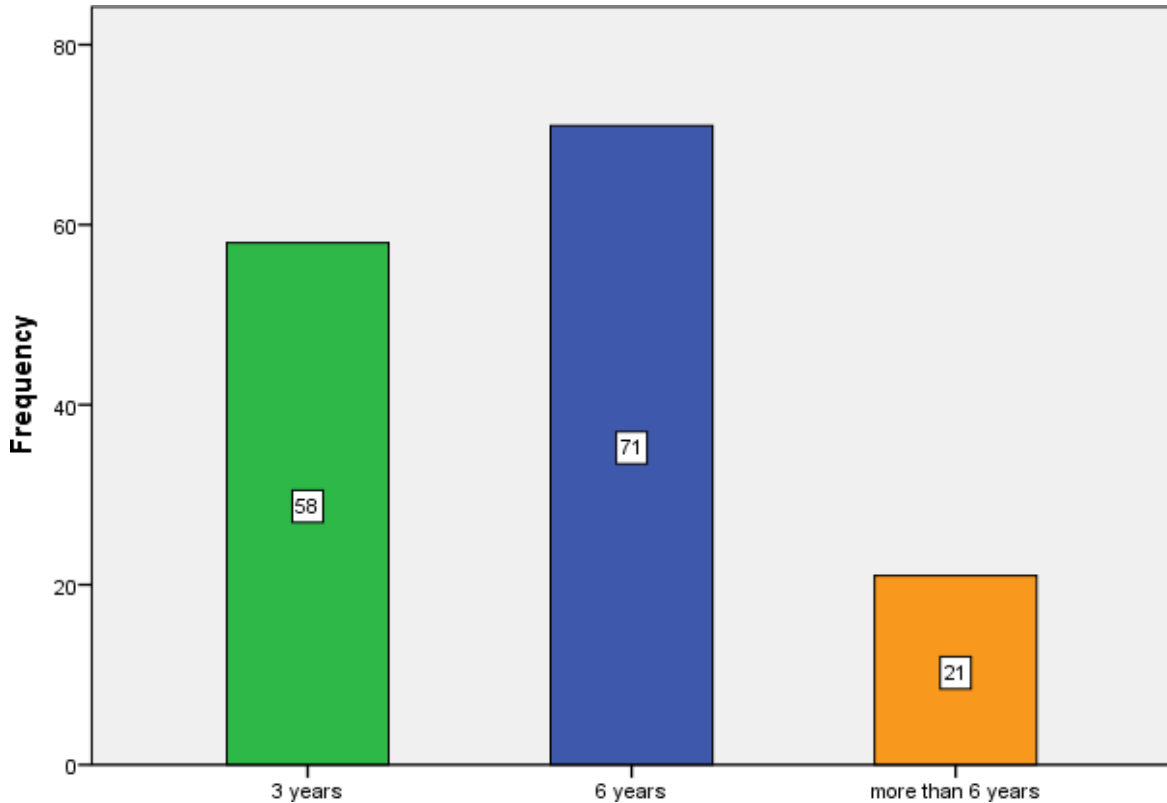
25(16.7%), General Ward 38(25.3%) and those who works in Medical emergency is 27(18%) out of 150 participant.

Years of experience

	Frequency	Percent	Valid Percent	Cumulative Percent
3 years	58	38.7	38.7	38.7
6 years	71	47.3	47.3	86.0

Valid	more than 6 years	21	14.0	14.0	100.0
Total		150	100.0	100.0	

Fig: 3



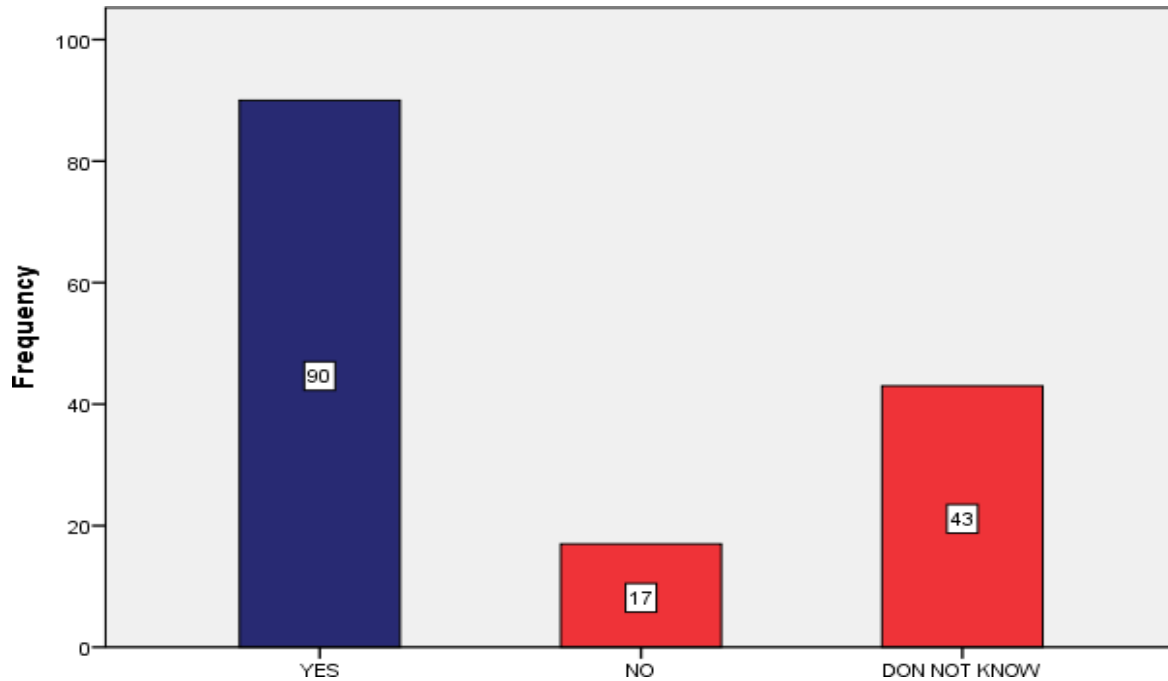
As shown in the above table #3 the frequency & percentage of participants by years of experience. The frequency of nurses who had 3 years of

experience is 58(38.7%), 6 years of experience is 71(47.3%), and more than 6 years of experience is 21(14.0%).

The central line bundle is a group of evidence intervention when implemented together, result in better outcomes then when implemented individually

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	90	60.0	60.0	60.0
NO	17	11.3	11.3	71.3
Valid DON NOT KNOW	43	28.7	28.7	100.0
Total	150	100.0	100.0	

Fig: 1



As shown in the above table#1the subject response to “the central line bundle is a group of evidence intervention when implemented together, result in better outcomes then when implemented

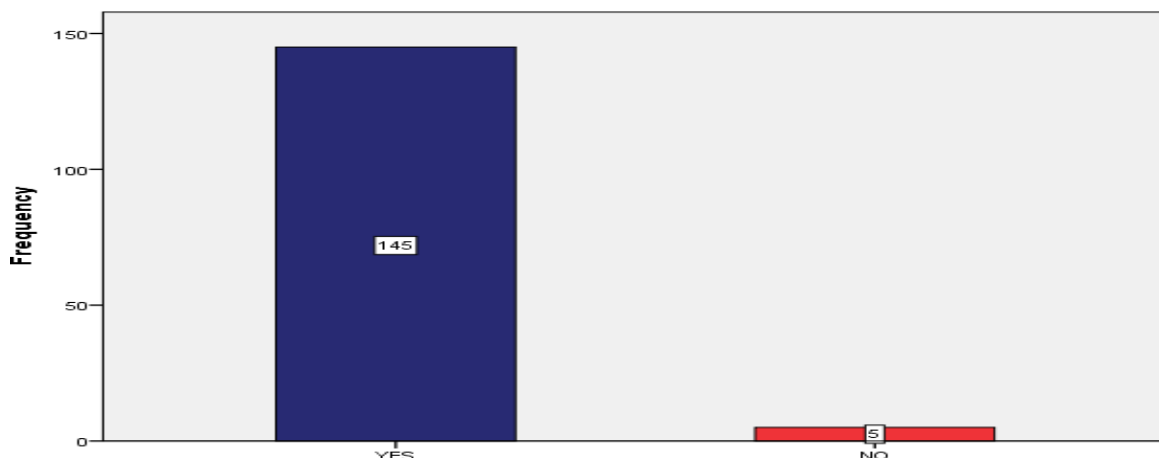
individually” the majority of the subject responds correctly (yes) 90(60.0%), while small number of subject responds incorrectly (No & Do not know) 60(40%).



hand hygiene is a key component of evidence base central line insertion bundle

	Freque ncy	Percent	Valid Percent	Cumulative Percent
Valid YES	145	96.7	96.7	96.7
Valid NO	5	3.3	3.3	100.0
Total	150	100.0	100.0	

Fig: 5



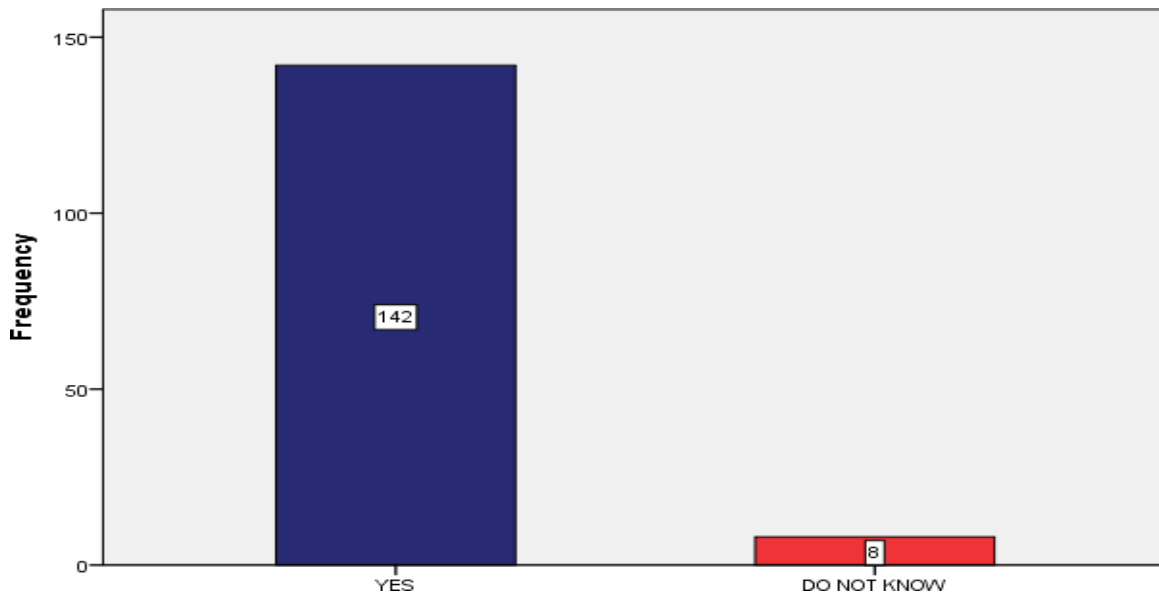
As shown in the above table#5 the subject response to question that “hand hygiene is a key component of evidence base central line insertion bundle “the majority of the subject respond

correctly (yes) 145(96.7%), while small number of the subject respond incorrectly (no) 5(3.3%).

wearing maximal barrier precautions (include: if they cape, mask, and sterile gloves) is essential when insertion a central line

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	142	94.7	94.7	94.7
DO NOT KNOW	8	5.3	5.3	100.0
Total	150	100.0	100.0	

Fig: 6



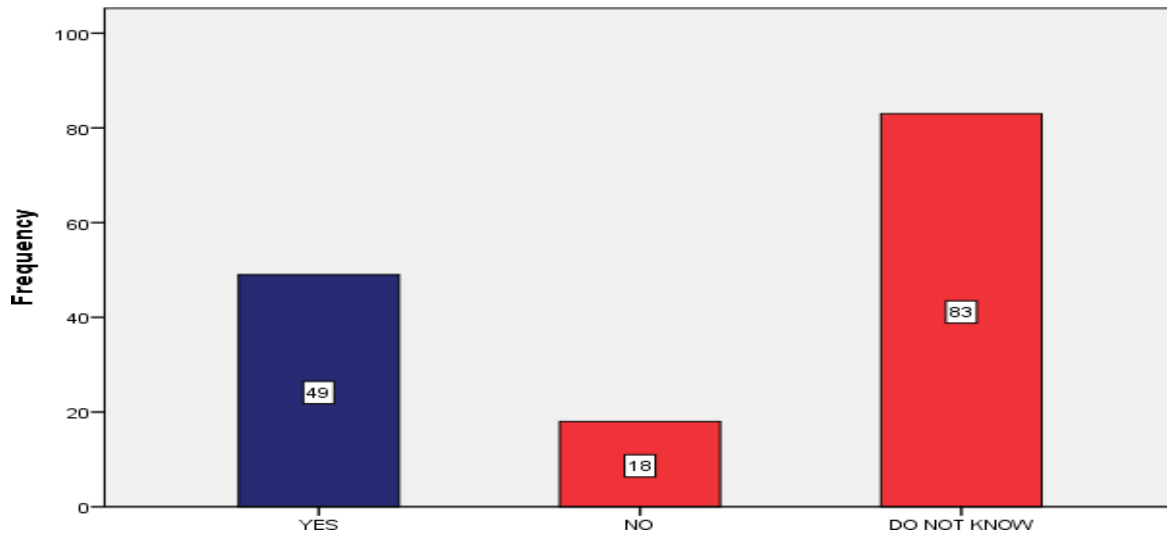
As shown in the above table#5 the subject response to question that “wearing maximal barrier precautions (include: if they cape, mask, and sterile gloves) is essential when insertion a

central line “majority of the subject respond correctly (yes) 142(94.7%), while minor amount of the subject response in (No) 8(5.3%).

The patient should be draped with a full body drip(heat to toe) prior to insertion of the central line

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	49	31.6	32.7	32.7
NO	18	11.6	12.0	44.7
Valid DO NOT KNOW	83	53.5	55.3	100.0
Total	150	96.8	100.0	

Fig: 7



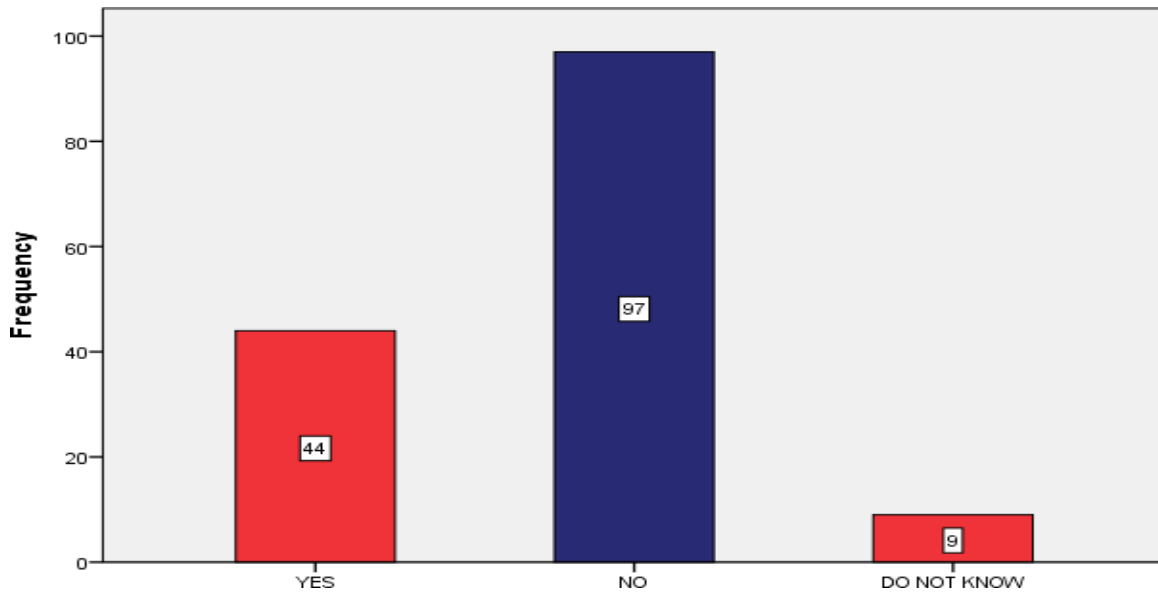
As shown in the above table#7 the subject response to question “the patient should be draped with a full body drip (heat to toe) prior to insertion of the central line “some of the subject response correctly

(YES) 49(32.7%), while large number of the subject respond incorrectly (NO & DO NOT KNOW) 101(67.3%).

Iodine is not the prepared prep agent, as recommended by the institute for healthcare improvement “central line bundle, for adult patient.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	44	28.4	29.3	29.3
Valid NO	97	62.6	64.7	94.0
Valid DO NOT KNOW	9	5.8	6.0	100.0
Total	150	96.8	100.0	

Fig: 8



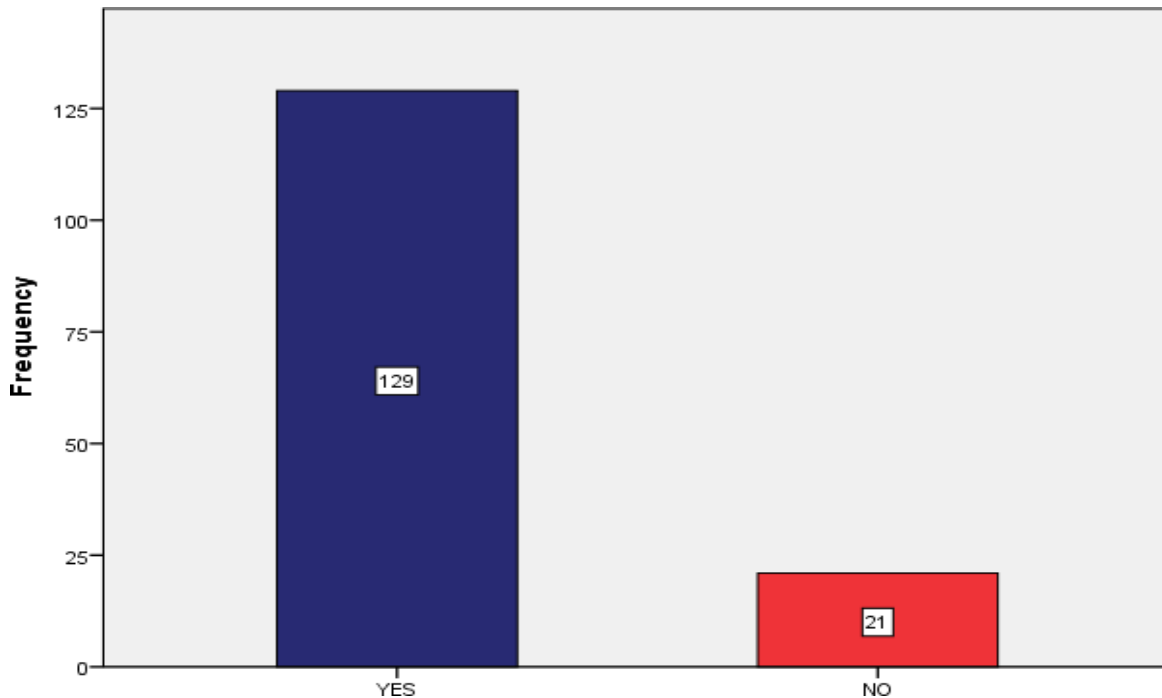
As shown in the above table#8 the subject response to question “Iodine is not the prepared prep agent, as recommended by the institute for healthcare improvement “central line bundle, for adult patient”. The frequency of subject who

respond correctly (No) is 97(64.7%), while those who respond incorrectly (Yes & Do not know) is 54(35.3%).

Choice of optimal selection Cather site is essential to prevent infection.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	129	86.0	86.0	86.0
Valid NO	21	14.0	14.0	100.0
Total	150	100.0	100.0	

Fig: 9



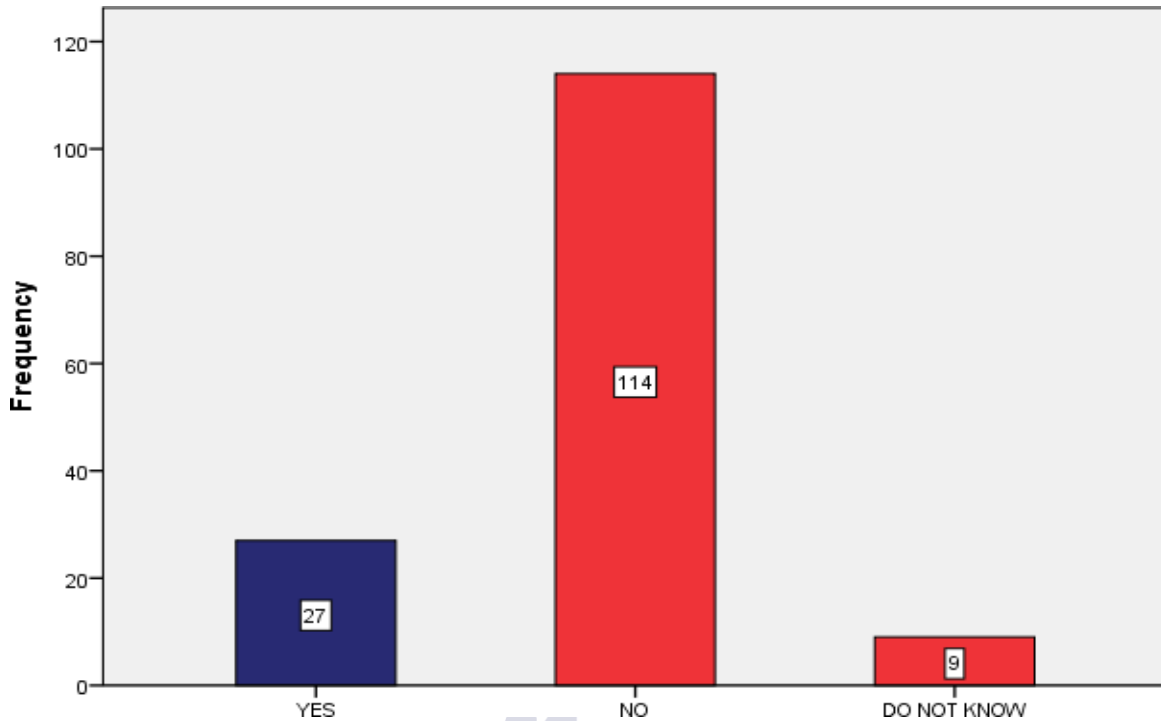
As shown in the above table#9 the subject response to question “Choice of optimal selection Cather site is essential to prevent infection”. The

frequency of the subject who respond correctly (Yes) is 129(86.0%), while those who respond incorrectly (No) is 21(14.0%).

Not documenting the details of the procedures in patient record is considered as non complains.

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	27	18.0	18.0	18.0
NO	114	76.0	76.0	94.0
Valid				
DO NOT KNOW	9	6.0	6.0	100.0
Total	150	100.0	100.0	

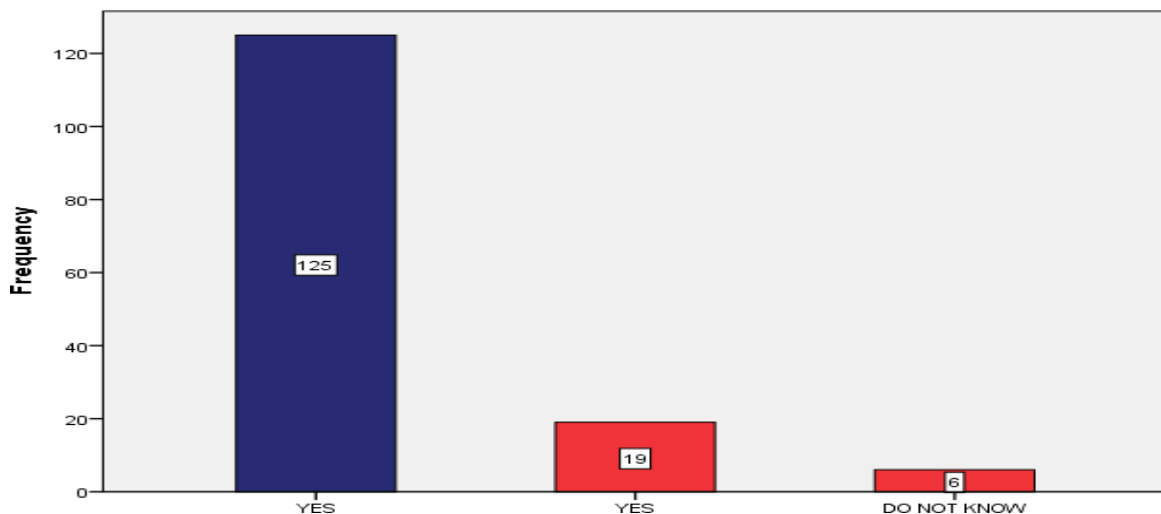
Fig: 10



Daily assessment of the central line is essential component to prevent infection.

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	125	83.3	83.3	83.3
YES	19	12.7	12.7	96.0
Valid				
DO NOT KNOW	6	4.0	4.0	100.0
Total	150	100.0	100.0	

Fig: 11



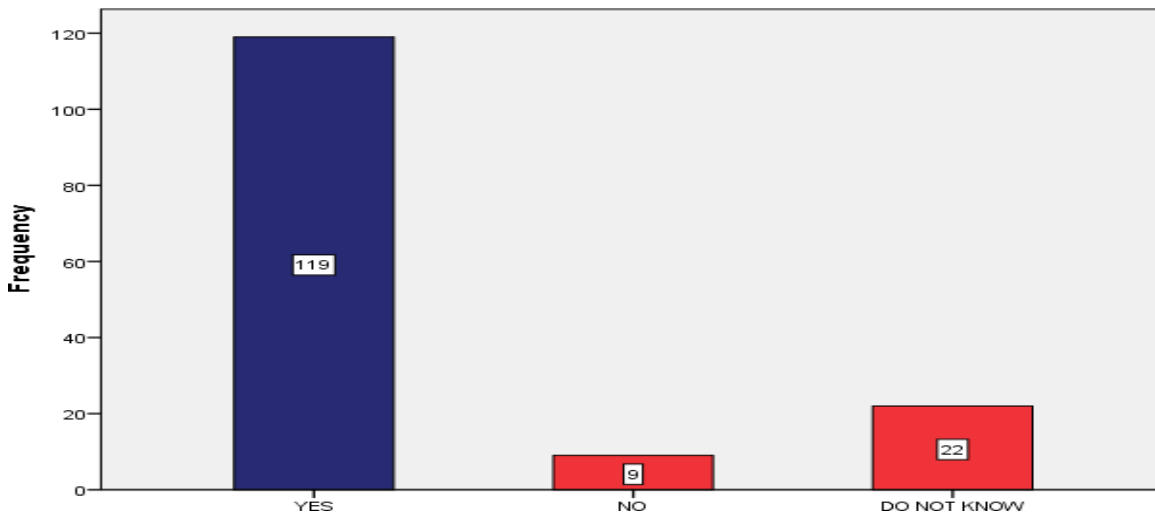
As shown in above table#11 the subject respond to question “Daily assessment of the central line is essential component to prevent infection “the

frequency of the subject who respond correctly (yes) is 125(83.3%), while those who respond incorrectly (no & do not know)25(16.7%).

Unnecessary central line should remove immediately to prevention of infection

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	119	79.3	79.3	79.3
NO	9	6.0	6.0	85.3
Valid DO NOT KNOW	22	14.7	14.7	100.0
Total	150	100.0	100.0	

Fig: 12



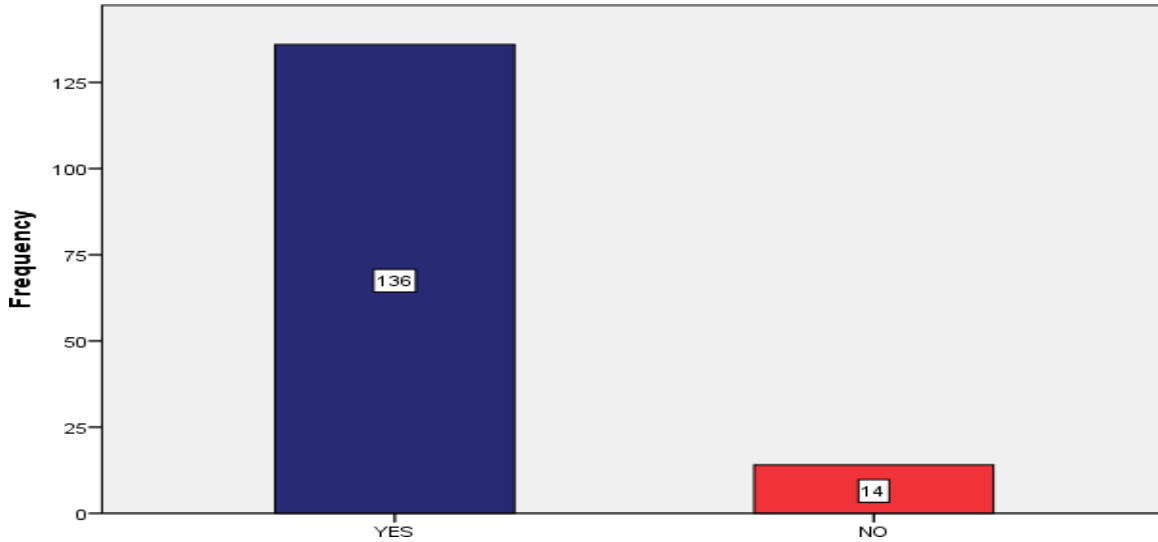
As shown in the above table#12 the subject response to question “Unnecessary central line should remove immediately to prevention of infection” the frequency of the subject who

respond correctly (yes) is 119(79.3%), while those who respond incorrectly (no & do not know)31(20.7%).

Dressing change under aseptic technique is important for central line maintenance bundle.

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	136	90.7	90.7	90.7
Valid NO	14	9.3	9.3	100.0
Total	150	100.0	100.0	

Fig: 13



As shown in the above table#13 the subject response to question “Dressing change under aseptic technique is important for central line

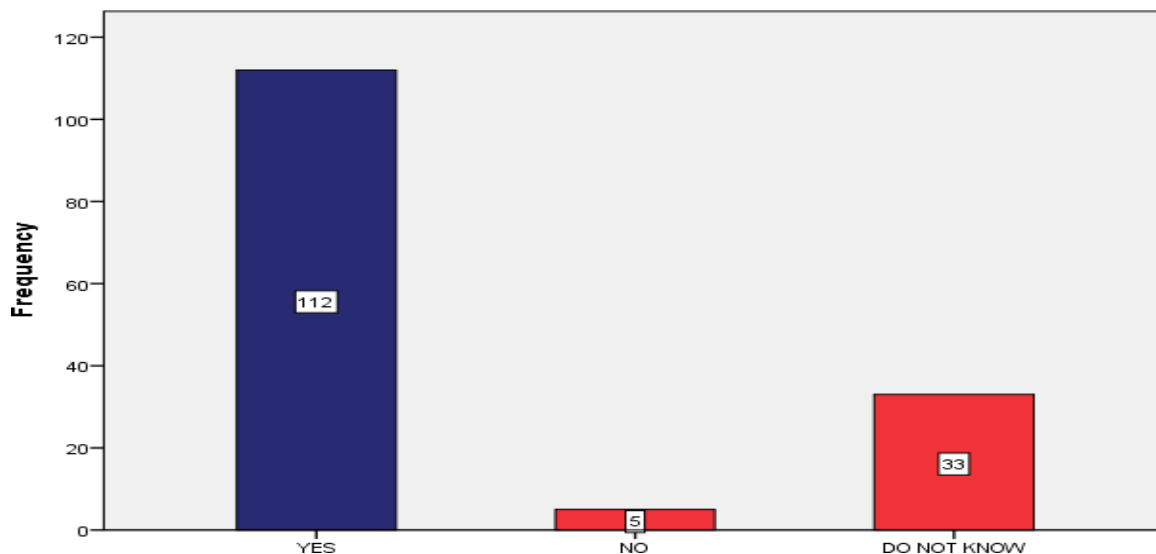
maintenance bundle “the frequency of the subject who respond correctly (YES) is 136(90.7%), while those who respond incorrectly (no) is 14(9.3%).

Table No 14

The administration set should be change frequently.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	112	74.7	74.7	74.7
NO	5	3.3	3.3	78.0
DO NOT KNOW	33	22.0	22.0	100.0
Total	150	100.0	100.0	

Fig: 14



As shown in the above Table #14, the subject response to question that “The administration set should be change frequently”. The frequency of

the subject that responds correctly (Yes) is 112 (74.7%), while those responds incorrectly (No) is 39 (25.3%).

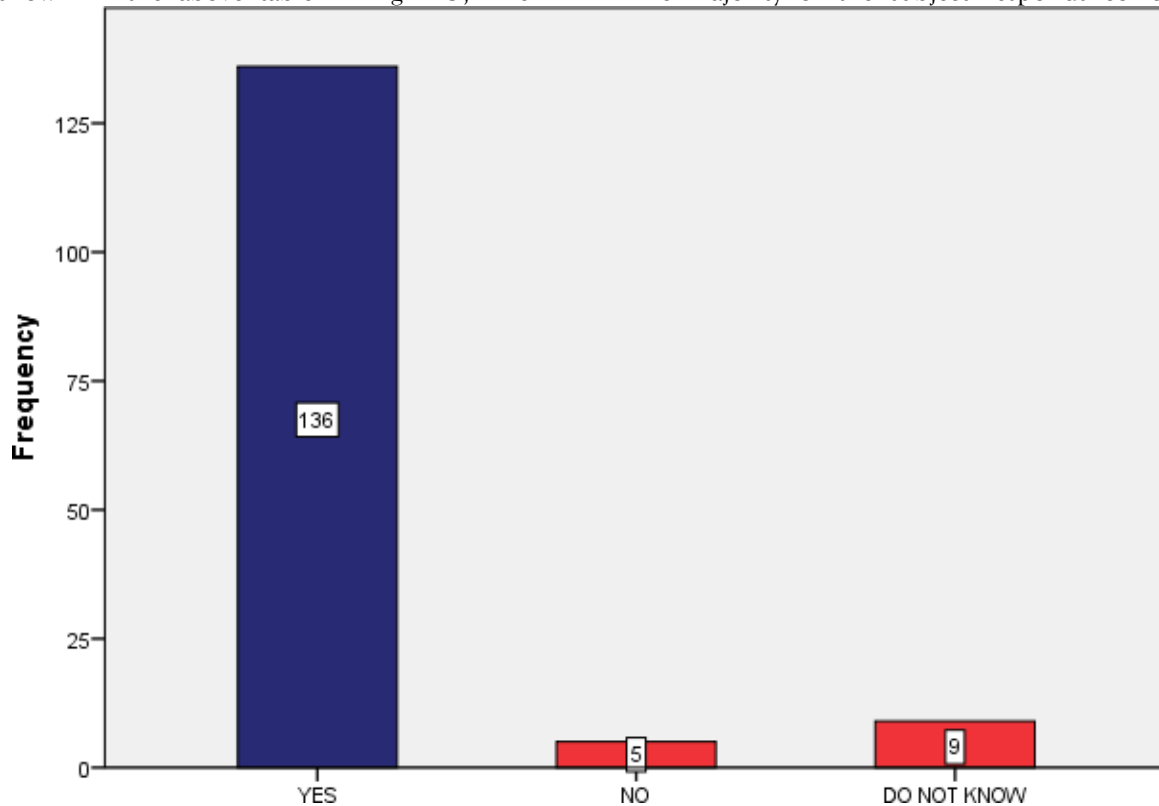
After placement of central line has been verified, connecting previously used iv tubing to the new central venous access line is not considered ok.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid YES	136	90.7	90.7	90.7
NO	5	3.3	3.3	94.0
DO NOT KNOW	9	6.0	6.0	100.0
Total	150	100.0	100.0	

Fig: 15

As shown in the above table & Fig #15, The

The majority of the subject responds correctly



participant response to question that “After placement of central line has been verified, connecting previously used iv tubing to the new central venous access line is not considered ok”.

(Yes) is 136(90.7%), while the small number of subject responds incorrectly (No) 14(9.3%) out of 150 subjects.

Table No: (1) Sociodemographic Characteristics of study participant

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
	male	13	8.7	8.7	8.7
	female	137	91.3	91.3	100.0

Total	150	100.0	100.0
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Table No: (2)

Ward Distribution of Nurses					
		Frequency	Percent	Valid Percent	Cumulative Percent
	medical icu	30	20.0	20.0	20.0
	cardiac icu	30	20.0	20.0	40.0
	surgical icu	25	16.7	16.7	56.7
	General Ward	38	25.3	25.3	82.0
	medical emergency	27	18.0	18.0	100.0
	Total	150	100.0	100.0	
Years of experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
	3 years	58	38.7	38.7	38.7
	6 years	71	47.3	47.3	86.0
	more than 6 years	21	14.0	14.0	100.0
	Total	150	100.0	100.0	

Distribution of Participant based on their response to knowledge questions regarding Central venous insertion.

Knowledge Questions	Yes (%)	No (%)	Don't Know (%)
The central line bundle is a group of evidence intervention when implemented together, result in better outcomes then when implemented individually.	90(60%)	17(11.3%)	43(28.7%)
Hand hygiene is a key component of evidence base central line insertion bundle	145(96.7%)	5(3.3%)	nill
Wearing maximal barrier precautions (include: if they cape, mask, and sterile gloves) is essential when insertion a central line	142(94.7%)	nill	8(5.3%)
The patient should be draped with a full body drip(heat to toe) prior to insertion of the central line.	49(32.7%)	18(12.0%)	83(55.3%)
Iodine is not the prepared prep agent, as recommended by the institute for healthcare improvement “central line bundle, for adult patient.	44(29.3%)	97(64.7%)	9(6.0%)
Choice of optimal selection Cather site is essential to prevent infection.	129(86.0%)	21(14.0%)	nill
Not documenting the details of the procedures in patient record is considered as non complains.	29(18.0%)	114(76.0%)	9(6.0%)
Daily assessment of the central line is essential component to prevent infection.	125(83.3%)	19(12.7%)	6(4.0%)
Unnecessary central line should remove immediately to prevention of infection.	119(79.3%)	9(6.0%)	22(14.7%)

Dressing change under aseptic technique is important for central line maintenance bundle.	136(90.7%)	14(9.3%)	nil
The administration set should be change frequently.	112(74.7%)	5(3.3%)	33(22.0%)
After placement of central line has been verified, connecting previously used iv tubing to the new central venous access line is not considered ok.	136(90.7%)	5(3.3%)	9(6.0%)

Recommendations:

The researchers recommended a training program and manual handbook should be designed to increase nurses’ knowledge of central venous catheter insertion in order to prevent infection in ICU through new technical methods. And further study should be conducted by using large study sample and data collected through morning and evening shift.

Conclusion:

Our study confirmed that 53.3% of the nurses had poor level of knowledge regarding Central venous insertion. The poor level of knowledge may be related to its duration of experience in hospital or lower

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