Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

Assessment of Central Line Associated Blood Stream Infection among Critical Ill Patients

Rasha Mohamed Elsayed Ali Elauoty *, Prof. Dr. Zeinab Hussein Ali **,
Prof. Dr. Gamal Ali Bader ***, Dr. Mohamed Elsayed Abo Ghabsha ****

* Medical Surgical Nursing, Faculty of Nursing, Helwan University, Eygpt.

** Medical Surgical Nursing, Faculty of Nursing, Helwan University, Eygpt.

*** Internal Medicine Departement, Faculty of Medicine, Alzhar University, Egypt.

**** Clinical Pathology Departement, Faculty of Medicine, Alzhar University, Egypt.

Abstract: **Central Line Associated Blood Stream Infection are expensive, common, potentially fatal and have greater impact on the patient which can lead to increase in costs, length of stay and morbidity and mortality rates, especially among critical ill patients. *The aim of this study* was to assess central line associated blood stream infection among critical ill patients. *Design:* a descriptive exploratory study. *Setting:* the study was carried out at Medical Intensive Care Units at at El-Hussein Hospital, Al-azhare University. *Study subjects:* a purposive sample of 30 adult patients with different age group and gender were included in this study. *Data collection tools:* structured patient assessment sheet and assessment sheet for insertion site. *Results:* this study revealed that, 13.3% of critical ill patients developed Central Line Associated Blood Stream Infections and the predominant causitive microorganisms were Coagulase-negative staphylococcus(6.7%). *Conclusion:* based on the study finding, The prevalence of CLABSI was particularly high in intensive care units and can be prevented. *Recommendations:* this study recommends the importance of prevention of central line associated blood stream infection in intensive care units.**

Keywords: **Central venous line, Central line-associated blood stream infection, Critical ill patients.**

1. INTRODUCTION

Central venous catheters play an important role in the treatment of hospitalized patients, especially critically ill patients. Intensive Care Units employ measures such as diagnostic procedures and invasive devices that may trigger complications such as healthcare-associated infections (HAI). The challenges imposed to the prevention of nosocomial infections are even greater in an ICU due to the variety of microorganisms, often multi-resistant, which require the use of broad-spectrum antibiotics. ICUs are characterized by performing invasive procedures intended for diagnostic purposes or to enable the cure of patients, but which complicate the control of infections. Note that central line-associated bloodstream infection is the primary complication of central venous catheters **(Perin et al., 2016)**.

Intensive care units are highly qualified to care and treat patients at risk through invasive therapy, procedures and devices such as the central venous catheter. The CVC is one of the most common devices in the ICU, since it is used to monitor hemodynamics and deliver vasoactive drugs, antibiotics and total parenteral nutrition. Despite its benefits, the CVC can lead to mechanical or infectious complications. The latter are more frequent and have greater impact on the patient. CLABSIs are a significant cause of preventable harm that lead to increases in morbidity and mortality, length of stay, and healthcare costs, especially among ICU patients**. (Fortunatti, 2017)**

A central line-associated bloodstream infection is defined as a primary bloodstream infection in a patient with a central venous catheter in place within the 48 hour period prior to the development of positive blood cultures. Three major groups of nosocomial CVC infections can be distinguished: 1) CVC exit-site infection; 2) CVC-associated clinical sepsis; and 3) primary laboratory-confirmed BSI either associated or related to a CVC **(Centers for Disease Control and Prevention, 2017).**

Local inflammation at the CVC exit site, including erythema, tenderness, warmth and/or purulent discharge is suggestive of an exit-site infection. If the catheter is removed and highly colonized with microorganisms, the local CVC infection may be associated with a potential systemic CRBSI and antibiotic therapy must be considered unless skin contaminants such as S. epidermidis or other coagulase-negative staphylococci are isolated. CVC-associated clinical sepsis is defined as fever, hypotension or oliguria in the presence of a CVC and without evidence of other infection sites, but without a positive blood culture test (either not done or with a negative result). Although of benefit to the individual patient, clinical sepsis is not used for prospective CVC infection surveillance any longer, with the exception of neonates and infants in the first year of life **(O'Grady et al., 2011).**

Approximately 90% of all CLABSIs occur due to CVC use, resulting in increased lengths of stay, increased costs, and higher mortality rates. CLABSIs are one of the most significant healthcare-associated infections (HAIs) in the ICU setting, representing 10% to 20% of all HAIs **(Bianco, Coscarelli, Nobile, Pileggi, & Pania, 2013).**

These infections are the leading cause of death among Hospital acquired infections with reported mortality rates of 12% to 25% in adult ICU patients. CLABSIs represent a significant economic burden for healthcare organizations, prolonging a patient‟s hospitalization an average of seven days with an episodic cost of approximately $45,000. **(Lissauer, Leekha, Preas, Thom, & Johnson, 2012)**

Significance of the study

Central line associated bloodstream infections (CLABSIs) impose a significant economic burden for patients admitted to the intensive care unit for adults. Central line associated blood stream infections remain a major complication of central venous catheters and a leading cause of Hospital Acquired Infections in the Critical Care Unit. These CLABSIs not only are costly to health care systems and individuals but can also increase morbidity and mortality significantly in both developed and developing countries. CLABSIs are serious infections but often preventable when evidence-based guidelines such as CLABSI care bundle are used during the insertion and maintenance of central venous catheters. **(Jocyline, Hannah, &Waithira, 2018)**

Aim of the Study:

This study was aimed to assess central line associated blood stream infection among critical ill patients through:

1. Assess incidence rate of central line associated blood stream infection among the critical ill patients.

2. Assess clinical manifestation of central line associated blood stream infection among the critical ill patients

3. Assess out comes of central line associated blood stream infection among the critical ill patients

Research question:

What is the incidence rate of central line associated blood stream infection among the critical ill patients?

What is the clinical manifestation of central line associated blood stream infection among the critical ill patients?

What is the out comes of central line associated blood stream infection among the critical ill patients?

2. SUBJECT AND METHODS

I. Research design: A desciptive exploratory research design was used.

A. Setting: This study was carried out at Medical Intensive Care Units at El-Hussein Hospital, Al-azhare University.

B. Sample: A purposive sample of 30 adult patients from both genders with central line catheter was involved in this study from the above mentioned setting who accepted to participate in the study.

II. Technical Design:

Tools of data collection: Two tools utilized in the current study.

Tool (I): Structured Patient Assessment Sheet

It was developed by the researcher based on the recent literatures **(Centers for Disease Control and Prevention, 2017)** to assess the effect of implementing central line bundle care on the occurrence of blood stream infection among critical ill patients. It was included the following parts:

A. Socio - Demographic Characteristics it was concerned with the characteristics of the patients e.g. Gender, age, sex, admission date, medical data (medical diagnosis & medical history), purpose of insertion, length of hospital stay, level of consciousness and site of insertion.

B. Patient Physical Assessment: It was filled by the researcher to assess vital signs which included (pulse, respiration rate, blood pressure and body temperature) and microbiological data as (leukocyte count, blood culture & type of microorganisms).

Tool (II): Assessment Sheet of Insertion Site: It was developed by the researcher based on the recent literatures **(Haddadin & Regunath, 2018) & (Centers for Disease Control and Prevention, 2017)** to assess signs and symptoms of central line blood stream infection. It was included local and systemic signs and symptoms of blood stream infection based on criteria for diagnosis of central line blood stream infection.

A scoring system for tool II: Assessment Sheet of Insertion Site Tool was scored as the following: Yes = 2 grade and No= 1.

III. Method included:

1. The preparatory Phase:

It included reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection and central line bundle care.

- Validity

The tools were revised by a jury of seven experts as the following; two Lecturers of medical, surgical nursing from faculty of nursing, British University, professor of medical, surgical nursing from faculty of nursing, Cairo University, two lecturers and assistance professor of medical, surgical nursing from faculty of nursing, Helwan University and professor of internal medicine from faculty of medicine, Helwan University, who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability. Minor modifications were done.

- Reliability:

Reliability of the developed tool was tested to determine the extent to which the questionnaire items are related to each other. The Cronbach's alpha model which is a model of internal consistency was used in the analysis (value throughout the assessment are 0.83, 0.83). Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1, higher value (more than 0.7) denote acceptable reliability.

- Pilot Study:

A Pilot study was carried out on 10% of the sample under study to test the applicability, clarity and efficiency of the tools, then the tools was modified according to the results of the pilot study, patients whom shared in the pilot study were not included in the sample and replaced by other patients.

Field work:

1. An official permission for conducting the study was obtained from administrative and responsible personnel after explaining the aim and nature of the study and submission of a formal letter from the Faculty of Nursing.

2. Tools were developed after reviewing recent relevant literatures.

3. Meeting and discussion were held between the researcher and the nursing administrative personnel to explain the objectives and the nature of the study to gain their cooperation during the implementation phase of the study.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

4. Formal consents were obtained from conscious patients, whereas the consents of unconsciousness patients were obtained from their significant

5. Demographic data,current and past medical assessmentwere filled out for all patients.

6. Central line assessment for detection of local signs of infection were done for all patients after insertion.

7. Systemic assessment of signs and symptoms of central line associated blood stream infection were conducted after insertion

8. Body temperature, WBCs, blood culture were recorded for all patients after 48 hours of line insertion.

9. All blood cultures were obtained from patients reviewed by the General lab at El Hussein hospital.

10. After that the researcher recorded the out come of infection as the need for mechanical ventilator, additional antibiotics.

Ethical Considerations:

- The research proposal approval was obtained from a scientific research ethics committee of the faculty of nursing at Helwan University before starting the study.
- The researcher clarified the objective and aim of the study to the patients included in the study.
- The researcher assured maintaining anonymity and confidentiality of the subject data.
- Patients were informed that they are allowed to choose to participate or withdraw from the study at any time. Ethics, culture, values were respected.

Statistical Design:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as a mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

Limitations of the study

- Blood culture not performed as routine laboratory investigation for patients.
- Unavailability of blood culture bottle in the hospital.

3. RESULTS

Table (1): Descriptive statistics for both study and control group regarding Socio- demographic characteristics of the studied patient.

Demographic data	No.	%
Age (category)		
20-35 years	1	3.3
36-50 years	11	36.7
51-65 years	18	60.0
Age (years)		
Range	20-65	
Mean±SD	51.87±11.25	
Gender		
Male	14	46.7
Female	16	53.3
Marital status		
Single	1	3.3
Married	21	70.0
Widow	8	26.7

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

Residence:		
Urban	12	40
Rural	18	60
Occupation:		
Professional	9	30
House wife	16	53.3
Employee	3	10
Not work	2	6.7
Education		
Illiterate	8	26.7
Can read and write	7	23.3
Preparatory	3	10
Secondary	7	23.3
University / Higher	5	16.7

Table (2): Reveals that, 53.3% of the studied patients were females, 46.7% were males with mean and standard deviation values of age 51.87±11.25 years old. 70.0% of the patients were married and 26.7% were widowed. 60% were lived in rural and 40% were lived in urban. 53.3% were house wife, 30% were professional, 10% were employee, while 6.7% were not work. 26.7% of the patients were illiterate, 23.3% had secondary education, also 23.3% can read and write, 16.7% were university graduates, while 10% had preparatory education.

Table (3): Descriptive statistics regarding medical data of studied patients.

Medical data	***(n=30)***	
	No.	**%**
Current medical diagnosis		
Respiratory disease	9	30.0
Renal disease	3	10.0
Liver disease	4	13.3
Neurological disease	4	13.3
Sever anemia	1	3.3
Diabetic ketoacidosis	5	16.7
Metabolic acidosis	4	13.3
Shock	0	0.0
Past medical history		
Diabetes mellitus	4	13.3
Hypertesion	2	6.7
Diabetes and Hypertension	15	50.0
Cardiac Disease	1	3.3
Respiratory Disease	2	6.7
Renal Disease	2	6.7
Liver disease	2	6.7
Neurological disease	2	6.7
Level of consciousness		
Consious	12	40.0
Unconsious	18	60.0
Purpose of central line insertion		
1. Hemodynamic monitoring	10	33.3
2. Long term IV therapy	14	46.7
3. Administer total parentral nutrition	4	13.3
4. Dialysis	2	6.7
Site of insertion		
Subclavian vein	2	6.7
Jugular vein	28	93.3
Femoral vein	0	0.0

Table (2): Shows that, 30% of studied patients had respiratory diseases, 50.0% were diabetic and hypertensive. Long term IV therapy was the main purpose for central line insertion and 93.3% of insertion site were jugular vein.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

Table (4): Descriptive statistics regarding vital signs for studied patients.

Vital signs	N	%
Temperature		
< 36.5	0	0
36.5-37.5	25	83.3
>37.5	5	16.7
X	37.9	
SD	1.12	
Pulse		
< 60b/m	0	0
60-90bm	20	66.7
>90bm	10	33.3
X	95	
SD	9.38	
Respiration		
< 14c/m	0	0
14-20cm	19	63.3
>20cm	11	36.7
X	20.9	
SD	3.92	
Blood pressure		
<120/80mmhg	9	30
120/80-140/95mmhg	12	40
>140/95mmhg	9	30

Table (3) shows that ,16.7% of patients had temperature mor than 37.5 while 33.3% had rapid pulse and rapid respiration.

Table (4): Descriptive statistics regarding microbiological data.

Microbiological data	Control *(n=30)*	
	No.	%
Blood culture		
1) Central blood culture		
Positive	5	16.7
Negative	25	83.3
If blood culture positive:		
1. Staphylococcus aureus	0	0.0
2. Coagulase-negative staphylococcus	2	6.7
3. Enteric Gram-negative bacilli	0	0.0
4. Enterococci and streptococci	0	0.0
5. Pseudomonas	1	3.3
6. Klebsiella	1	3.3
7. Candida species	1	3.3
2) Peripheral blood culture:		
Positive	4	13.3
Negative	26	86.7
If blood culture positive:		
Coagulase-negative staphylococcus	2	6.7
Pseudomonas	1	3.3
Klebsiella	1	3.3
Acinetobacter	0	0.0

Table (4) reveals that, 6.7 % of infection is caused by Coagulase-negative staphylococcus followed by Pseudomonas and Klebsiella.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

Table (5): Descriptive statistics regarding the prevelace of central line associated blood stream infection.

Central line associated blood stream infection	*(n=30)*	
	No.	%
Negative	26	86.7
Positive	4	13.3

Table (5) reveals that, 13.3% of patients had apositive central line blood stream infection.

Table (6): Descriptive statistics regarding local assessment for signs and symptoms of infection

Local assessment for signs and symptoms of infection	N	%
Tenderness		
Yes	5	16.7
No	25	83.3
Redness		
Yes	10	33.3
No	20	66.7
Swollowen vein		
Yes	1	3.3
No	29	96.7
Pus discharge		
Yes	1	3.3
No	29	96.7
Vein hard on palpation		
Yes	1	3.3
No	29	96.7
Inability to advance flush of line		
Yes	0	0
No	30	100

Table (6): shows that, about 16.7% of patients was suffered from tenderness while 33.3 of studied patients was sufered from redness.

Table (7): Descriptive statistics regarding systemic assessment for signs and symptoms of infection

systemic assessment for signs and symptoms of infection	N	%
Fever		
Yes	5	16.7
No	25	83.3
Chills		
Yes	3	10
No	27	90
Hypotension		
Yes	1	3.3
No	29	96.7
Decrease Level of Conscious		
Yes	9	30
No	21	70
Rapid Pulse		
Yes	10	33.3
No	20	66.7

Table (7): shows that, about 16.7% of studied patients suffered from fever while about 30% were had decreased level of consciousness.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 3, pp: (235-246), Month: September - December 2020, Available at: www.noveltyjournals.com

Table (8): Descriptive statistics regarding out comes of infection for studied patients.

Outcomes of infection	*(n=30)*	
	No.	%
1. Need more intervention		
Yes	6	20.0
No	24	80.0
- Mechanical ventilator		
Yes	5	16.7
No	25	83.3
- Renal dialysis		
Yes	0	0
No	30	100.0
- Renal replacement therapy		
Yes	0	0.0
No	30	100.0
- Additional Antibiotics		
Yes	6	20.0
No	24	80.0
2. Increased length of ICU stay		
Yes	6	20.0
No	24	80.0
Mean length of ICU stay/day X	12.50	
SD	3.40	
Minimum	10	
Maximum	19	

Table (8): reveals that, about (20%) of patients need more intervention as mechanical ventilator (16.7%), additional antibiotics (20%) and increased length of ICU stay (20%).

4. DISCUSSION

The present study, finding regarding to the patient's characteristics revealed that, more than half of the total studied patients were in the age group from 51-65 years old. This may be due to patients with older age have more comorbidities, taking more medication and antibiotics and they have lower immunity than younger patients. This finding is supported by **Mekdad et al., (2018)** entitled "effect of nursing intervention protocol on the incidence of catheter associated urinary tract infection among critically ill patients" at Ain Shams University Hospitals, who reported that about half of the total studied patients were in the age group from 51-65 years old and this finding also similar to **Salamaa et al., (2015)** entitled "Implementation of central venous catheter bundle in an intensive care unit in Kuwait: Effect on central line-associated bloodstream infection", who report that, mean of age of the studied patients were 57.9.

Concerning medical diagnosis, this study reported that, about 30% of the studied patients were diagnosed with respiratory diseases as respiratory distress these patients were severely ill and this increased their likelihood of having multiple CVCs with multiple infusion lines and also prolonged use of these devices with prolonged hospitalization. This finding could be due to a lot of the studied patients suffered from hypertension and diabetes mellitus disease, which considered from risk factors for respiratory distress. This finding is in line with **Lin et al., (2015)** entitled " Central line-associated bloodstream infections among critically-ill patients in the era of bundle care", at the National Taiwan University Hospital, who reported that, major diagnosis in ICU were respiratory disease.

As regards level of consciousness, the result of the current study represents that, about more than half of the total studied patients were unconscious. This finding may be contributed to multiple invasive procedures like mechanical ventilation, central venous line, and critical diagnosis of the patients in Intensive Care Units. This result is in accordance with **Cavallazzi, Saad and Marik, (2012)** entitled "Delirium in the ICU: an overview", who stated that, most patients admitted to ICU usually had a different level of altered consciousness. This result also agreed with **Upadhyay, Bhalerao**

and Pratinidh, (2017) entitled " Study of Level of Consciousness and Electrolyte Abnormalities in Patients Admitted to Intensive Care Unit (ICU) ", who stated that altered states of consciousness are commonly seen in ICU's. It is seen that in neurological and neurosurgical ICU's altered states of consciousness are the main reason for the adult ICU admission.

Concerning the purpose of central line insertion, about half of the studied patients, central line was inserted for them due to long term intravenous therapy followed by hemodynamic monitoring. This finding disagreed with **Zaiton and Taha, (2014)** entitled "Effect of Implementing Central line Bundle on Minimizing Rate of Central Line-Associated Blood Stream Infection (CLA-BSI) among Intensive Care Patients", in Zagazig University Hospitals who reported that, (77.5%) of patients Inserted central line for them due to hemodynamic monitoring followed by (15%) for routine intravenous therapy while (7.5%) for Total parental nutrition. The purpose of central line insertion among control group was (60%) of patients Inserted central line for them due to hemodynamic monitoring followed by (20%) for routine intravenous therapy while (5%) for Total parental nutrition respectively.

Regarding to central line insertion site, the result of the current study represents that, the most common site used for insertion was intra-jugular vein with no use of femoral vein during insertion. This finding could be due to internal jugular vein is associated with less complications and the policy of medical ICU and the physicians prefer internal jugular vein. This finding supported by **El Nemr et al., (2013)** entitled "An Interventional Study to Decrease Central Venous Catheter Related Blood Stream Infection in Intensive Care Units at Zagazeg University Hospital", who mention that the most frequent used site for catheter insertion in emergency ICU was an internal jugular vein 54.2% and 60.1% of cases before and after intervention respectively with no use of femoral site. In surgical ICU, the most frequent used site after intervention was an internal jugular vein (56.6%) with no use of femoral site. This disagreed with **Beigmohammadi, (2015)** entitled "Incidence of Central Venous Catheter-Related Infection and Risk Factors in Critically Ill Postoperative Cancer Patients", who report that 53.2% of patient had a subclivian vein catheter.

As regards to vital signs, increased temperature, pulse and respiration and decreased blood pressure were reported after two days of insertion This finding supported by **Rode et al. (2017) entitled** "Study of central line-associated bloodstream infections in the intensive care unit: a prospective observational study", in India, who reported that, In general physical exam findings the most common positive finding was fever in 54 patients, tachycardia in 45 patients and hypotension.

As regards to microbiological data of the two groups regarding central line associated blood stream infection. The causative microorganism was coagulase negative staphylococci followed by Pseudomonas and Klebsiella. This finding agreed with **Khalil and Azqul, (2018)** entitled "Risk factors and microbial profile of central venous catheter related blood stream infection in medical cardiac care units, National Heart Institute, Egypt", who reported that the isolated micro-organisms with central venous catheter related blood stream infection were coagulase _ve staphylococci, S. aureus, klebseilla and Acinetobacter as the staphylococci were the most common isolated pathogens.

As regards to central line associated blood stream infection, about 13.3% of the studied patients was diagnosed positive central line blood stream infection. This finding supported by to **Salamaa et al., (2015)** entitled "Implementation of central venous catheter bundle in an intensive care unit in Kuwait: Effect on central line-associated bloodstream infection", who report that, about 14.7% of studied patients was diagnosed as central line associated blood stream infection.

Concerning local signs and symptoms of central line associated blood stream infection; this study showed that after two days of central line insertion the studied patients begin to suffer from tenderness and redness This revealed that redness and tenderness are primary local signs and symptoms of CLABSI. This finding agrees with **Haddadin and Regunath, (2019) entitled** "Central Line Associated Blood Stream Infections (CLABSI)" who report that, Exit site examination to look for signs of inflammation of tunneled catheters with inspection and palpation of the subcutaneous track is important. Patients may report pain, swelling, or discharge from the exit site and redness surrounding the exit site or along the subcutaneous track when exit site or tunnel infections are present. For long-term catheters, difficulty in drawing blood or poor flow is considered risk factors and manifestations of CLABSI.

Concerning systemic signs and symptoms; this study showed that, the studied patients begins to suffer from fever, chills, hypotension and rapid pulse. This finding explained that the classic presentation of CLABSI is the development of fever and chills immediately after accessing a catheter as fever firstly present as an indicator for the presence of infection, This

finding is in line with **Haddadin and Regunath, (2019) entitled** "Central Line Associated Blood Stream Infections (CLABSI)" in University of Missouri who report that, clinical manifestations vary depending on the severity of illness. Fever and chills are the most common manifestations, but may be masked if the patient is immunocompromised or at the extremes of age where atypical presentations of sepsis occur (altered mental status, hypotension, lethargy, fatigue).

As regard to length of hospital stay, the result of the current study represents that, the mean length of hospital stay of the control group with minimum 10 days and maximum 19 days tends to be higher. Increasing length of ICU stay increase the probability of infection and exposure to the CLABSI risk factors. This agreed with **Mishra et al., (2017)** entitled "Incidence, risk factors and associated mortality of central line-associated bloodstream infections at an intensive care unit in northern India" who report that, duration of central line more than 10 days and length of stay in ICU more than 21 days were independent predictors of acquiring CLABSI.

As regard to outcomes of infection for positive central associated blood stream infection in which the patient with CLABSI need mechanical ventilator and antibiotics. This finding agreed with **Lin et al. (2017)** entitled "Central line-associated bloodstream infections among critically-ill patients in the era of bundle care", who reported that the percentage of adequate empirical antibiotics was very high in the CLABSI group and additional infection-control measures to control endogenous flora spreading and empiric antibiotic for CLABSI are essential.

5. CONCLUSION

Based on the study findings, the following can be concluded; the central line associated bloood stream infection was extermely fatal, expensive, common and need more interventions as increase the need for additional antibiotics, mechanical ventilator and increase length of ICU stay.

6. RECOMENDATION

The study recommended that:

1. Blood culture should performed as routine laboratory investigation for patients for early detection of central line associated blood stream infection.

2. Developing a simplified and comprehensive booklet about central line associated blood stream infection for health care staff (nurses and physicians) in intensive care units.

3. The study should be replicated on large sample and different units in hospitals in order to generalize the results

REFERENCES

[1] **Bianco, A., Coscarelli, P., Nobile, C., Pileggi, C., & Pavia, M. (2013):** The reduction of risk in central line-associated bloodstream infections: Knowledge, attitudes, and evidence-based practices in health care workers. American Journal of Infection Control, 41, 107-112.

[2] **Cavallazzi, R., Saad, M. and Marik, P., (2012):** Delirium in the ICU: an overview, Ann Intensive Care. 2012; 2: 49. Published online 2012 Dec 27. doi: 10.1186/2110-5820-2-49, Pubmed, Accessed at 13-3-2019 at 1am.

[3] **Centers for Disease Control and Prevention, (2017):** Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and non-central line-associated Bloodstream Infection), Device-associated Module BSI.

[4] **El Nemr,W., Fahmy,H., Abed El Razek,G. and Abed El Salam, N.(2013):** An Interventional Study to Decrease Central Venous Catheter Related Blood Stream Infection in Intensive Care Units at Zagazeg University Hospital. Departments of Public Health and Ansethiology & Intensive Care *, Faculty of Medicine, Zagazig, Z.U.M.J.Vol.19; N.6; November; 2013. This available athttps://zumj.journals.ekb.eg/article_4320_e3a acessed at 3-4-2019 at 10pm.

[5] **Fortunatti, C., (2017):** Impact of two bundles on central catheter-related bloodstream infection in critically ill patients1, Rev. Latino-Am. Enfermagem Original Article 2017;25:e2951 DOI: 10.1590/1518-8345.2190.2951, available at : www.eerp.usp.br/rlae, acessed at 2-5-2018 at 4pm.

[6] **Haddadin, Y. & Regunath, H., (2018):** Central Line Associated Blood Stream Infections (CLABSI), available at https://www.ncbi.nlm.nih.gov/books/NBK430891/ Accessed at 30-4-2019 at 2pm.

[7] **Jocyline, M., Hannah, I. &Waithira, M., (2018):** Predictors and Prevalence of Central Line Associated Blood Stream Infections Among Adult Patients in Critical Care Units -Kenyatta National Hospital, American Journal of Nursing Science 2018, available at: http://www.sciencepublishinggroup.com/j/ajns, Vol. 7, No. 1, 2018, pp. 1-13. doi: 10.11648/j.ajns.20180701.11, acessed at 12-7-2019.

[8] **Khalaf, A., (2018):** Effect of nursing intervention protocol on the incidence of catheter associated urinary tract infection among critically ill patients, master thesis, faculty of nursing , Helwan University.

[9] **Khalil, G. and Azqul,M., (2018):** Risk factors and microbial profile of central venous catheter related blood stream infection in medical cardiac care units, National Heart Institute, Egypt, The Egyptian Heart Journal 70 (2018) 361–364, available at https://doi.org/10.1016/j.ehj.2018.07.001, acessed at 30-10-2018.

[10] **Kumar, A, Sharma, M., Jaideep,C. and Hazra,N., (2014):** Diagnosis of central venous catheter-related bloodstream infection without catheter removal: A prospective observational study, Med J Armed Forces India. 2014 Jan; 70(1): 17–21. doi: 10.1016/j.mjafi.2013.08.001, Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3946418/ Acessed at 20-5-2019 at 2am.

[11] **Lee, K., Cho, N., Jeong, S., Kim, M. and Han, s., (2018):** Effect of Central Line Bundle Compliance on Central Line-Associated Bloodstream Infections, pISSN: 0513-5796 • eISSN: 1976-2437 Yonsei Med J 2018 May;59(3):376-382 available at: https://doi.org/10.3349/ymj.2018.59.3.376. Acessed at 14-5-2019 at 2pm

[12] **Lin, A., Cheng, A., Chang, Y., Hung, M., Wang, J., Sheng, W., Hseuh,P., Chen Y and Chan, S., (2017):** Central line-associated bloodstream infections among critically-ill patients in the era of bundle care, Journal of Microbiology, Immunology and Infection (2017) 50, 339e348.

[13] **Lissauer, M. E., Leekha, S., Preas, M. A., Thom, K. A., & Johnson, S. B. (2012):** Risk factors for central line-associated bloodstream infections inthe era of best practice. Journal of Trauma, 72(5), 1174–1180.

[14] **Malek, A., Abouseif,H., Abd Elaziz,K., Allam, M. & Fahim,H. (2018):** Incidence Of Central Line-associated Bloodstream Infections In Intensive Care Units In A Private Hospital (Cairo, Egypt), Department of Community, Environmental and Occupational Medicine, Faculty of Medicine, Ain Shams University, Cairo, Egypt, The Open Public Health Journal, ISSN: 1874-9445 — Volume 12, 2019. available at: www.benthamopen.com/TOPHJ.

[15] **Mishra, S., Misra, R. Azim, A. , Baronia, A., Prasad, K., Dhole, T., Gurjar, M., Singh, R. and Poddar, B., (2017):** Incidence, risk factors and associated mortality of central line-associated bloodstream infections at an intensive care unit in northern India, International Journal for Quality in Health Care, Volume 29, Issue 1, February 2017, Pages 63–67, https://doi.org/10.1093/intqhc/mzw144, accessed at 20-6-2019.

[16] **O'Grady, NP., Alexander, M., Burns, LA., et al., (2011):** Guidelines for the prevention of intravascular catheter-related infections. Am J Infect Control 2011;39: S1-S34.

[17] **Perin, D., Erdmann, A., Higashi, G. & Sasso, G., (2016):** Evidence-based measures to prevent central line-associated bloodstream infections: a systematic review, Rev. Latino-Am. Enfermagem 2016; 24: e2787.

[18] **Rode, A., Bansod, P., Gujela, A. and Singh, A., (2017):** Study of central line-associated bloodstream infections in intensive care unit: a prospective observational study, international journal of medical research an review, Vol 5, No 04 (2017), available at http://medresearch.in/index.php/IJMRR/article /view/1622/2600, acessed at 30-6-2019 at 12am.

[19] **Salamaa, M., Jamalb, W., Mousad, H. &Rotimi, V., (2015):** Implementation of central venous catheter bundle in an intensive care unit in Kuwait: Effect on central line-associated bloodstream infection, King Saud Bin Abdulaziz, University for Health Sciences. Journal of Infection and Public Health (2016) 9, 34—41, available from: http://dx.doi.org/10.1016/j.jiph.2015.05.001, accessed at 1-11-2018 at 7pm.

[20] **Upadhyay, S., Bhalerao, N. and Pratinidh, S., (2017):** Study of Level of Consciousness and Electrolyte Abnormalities in Patients Admitted to Intensive Care Unit (ICU), International Journal of Contemporary Medical Research 2017;4(8):1739-1742, Volume 4| Issue 8 | August 2017, available at: www.ijcmr.com, acessed at 20-5-2019.

[21] **Wasserman, S. & Messina, A., (2018):** Guide to Infection Control in the Hospital Chapter 16: Bundles in Infection Prevention and Safety, International society of infectious diseases, pdf, https://www.isid.org/wpcontent/uploads/2018/02/ISID_InfectionGuide_Chapter16.pdf

[22] **Zaiton, H. and Taha, N., (2014):** Effect of Implementing Central line Bundle on Minimizing Rate of Central Line-Associated Blood Stream Infection (CLA-BSI) among Intensive Care Patients , Advances in Life Science and Technology www.iiste.org ISSN 2224-7181 (Paper) ISSN 2225-062X (Online) Vol.19, 2014.