Risk Factorsthat Contributed to Infection in a Surgical Siteamong Coronary Artery Bypass Graft Patients

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Abstract: *Coronary artery bypass grafting (CABG) is a universal surgery that is known for its reliability and is mainly operated on cardiac patients. Often, Infection in a Surgical Site ismainly reported cases of postoperative infections arises within a month of the surgical process. This could be the main reason for the patients' distress, morbidity, mortality, extended hospitalization and augment of total treatment coast as it affects the patients' daily activity living.* **Aim***: Assess the risk factors that contributed to Infection in a Surgical Site among coronary artery bypass graft patients.* **Design***: A quantitative retrospectivedesign was used.* **Setting:***The study was done in the unitofmedical record atUniversity of King Abdulaziz Hospital; data was gathered from the patient's electronic files.***Sample:***All males andfemale's patient who have undergone coronary artery bypass graft was registered during the period from January 2011 to December 2013.* **Tool***: The researchers were used one tool for data collection, consists of two parts.* **Part I. Patient assessment sheet***: the researchers designed it, to assess patients' demographic characteristics andmedical data.* **Part II: Bundle of Infection in a Surgical Site for Coronary Artery Bypass Graft:***This bundle used at King Abdul-Aziz University Hospital. The researchers used the data gathered by the bundle to assess the risk factors that contributed to Infection in a Surgical Site among coronary artery bypass graft. It consists of 14 items, 12 items of perioperative factors increased risk for wound infection and 2 items related to types of wound infection.* **Results:***The current study revealed that 9.1% had an infection in a surgical site, 5.8% had a superficial infection, whereas 3.3% deep infection. Moreover, it was noted that 100% the patients with Infection in a Surgical Site have diabetes mellitus, 81.85% hypertension, 36.4% chronic obstructive pulmonary disease and 36.4% peripheral vein disease, while 27.3% smoking and 72.7% of patients have elective surgery. The mean number of days where patients Infection in a Surgical Sitestayed in the intensive care unit was 4.5 day, and the mean number day's length of hospital stay was 15.9.***Conclusions:***According to the findings of the current study, the researchers conclude that, bundle has to be effective by reducing the occurrence of wound infections but thereby more other risk factors have occurred related to patient condition increase Infection in a Surgical Site among Coronary Artery Bypass Graft Patients like diabetes mellitus, hypertension, obesity, re-operation for bleeding, rewiring, and ventilation ≥ 24hr. However, the length of ICU stays around 5 days and the length of hospital stay around 16 days regarding infected wound cases.***Recommendations:***Future studied of Infection in a Surgical Site should aimprompt preoperative intervention and vigilantly monitored of patients with diabetes, hypertension, chronic obstructive pulmonary disease, and peripheral vascular disease.*
Keywords: *Infection in a surgical site, risk factors, coronary artery bypass graft.*

I. Introduction

Coronary artery bypass grafting is the best common operationof the heartand is a remarkably safe therapy. CABG is highly in effect of relieving warning sign of ischemic heart disease, as well as successful life expectation indefinite functional subcategories; these benefits are exaggerated in patients with the more severe illness or with damaged left ventricular function**[1].**

Infection in a surgical site are accompanying with enhancedillness, death, establish a financial load, and harmfullyaffect patient quality of life **[2].**The progress of infection in a surgical site lead to a considerable increase in the medical status and commercialload of operation. The monetary load of operation is increased due to prolonged patient hospitalization, diagnostic tests, and treatment, which lead to direct costs. Some patients may also need reoperation after the deterioration of infection in a surgical site, which is accompanying with augmentingextrabudgets**[3,4].**

Infection in a surgical site harmfullyinfluences on patient physical and psychologicalcondition. Increased patient sickness, death, and damage of incomes during recuperation are some of the unintended costs accompanying with infection in a surgical site. The patient, such as discomfort and nervousness, may also suffer insubstantial costs. In addition, patients may hinder wound healing and be more proneto secondary problems, such as bacteremia[5-8].

Perioperative complications, including sepsis,as important risk factors for death and early-renewed admission [9,10].Postoperative sepsis is a major, and possiblyavoidable, the complication of cardiac surgery. The changeability in post CABG or heartoperation-accompanying sepsis-related deathextended a three-times difference between the poorest and best quintile hospitals[10,11].

Various studies have explored Infection in a Surgical Site vis-à-vis CABG surgery to assess the underlying aspects that cause Infection in a Surgical Site . However, diabetes mellitus and obesity are the predominant causes of Infection in a Surgical Sitein CABG operationmay be either patient-associated or associated to the preoperative, intraoperative, postoperative care, and surgical treatment is given to the patient[12].

Study Aim

Assess the risk factors that contributed to infection in a surgical site among coronary artery bypass graft patients**.**

Research Question

What are the risk factors that contributed to the infection in a surgical site among coronary artery bypass graft patients?

II. Subjects and Methods

Research design: A Quantitative retrospective study approach was used.

Setting: The study was done in the unit of medical record at King Abdulaziz University Hospital (KAUH); datawas gathered fromthe patient's electronic files.The department of medical records also referred to as health information management department is charged with the responsibility of overseeing timely processing, completeness and the retrieval of all the patients' medical records if required (KAU College of Medicine, 2016).

Subjects: All patients' males and females who have undergone coronary artery bypass graft from January 2011 to December 2013. This added up to 120 CABG patients from electronic files were fulfilled from the above-mentioned setting.

A tool of the data collection: The researchers were used one tool for data collection for the purpose of this study, consists of two parts: **PartI. Patient assessment sheet:**The researchers designed it, to assess patients' demographic characteristics andmedical data. Demographic characteristicsof the patients**,** whichencompassed age, gender, and body mass index.Patients' medical data which included present medical diagnosis of the patients, smoking habit and comorbid diseases which include hypertension, chronic obstructive pulmonary disease (COPD), peripheral vascular disease and diabetes mellitus,length of stay in intensive care unit more than 2 days and length of days in the hospital more than 10 days.

Part II: Bundle of Infection in a Surgical Site for Coronary Artery Bypass Graft: This bundle used at King Abdulaziz University Hospital. The researchers used the data gathered by the bundle to assess the risk factors that contributed to Infection in a Surgical Site among coronary artery bypass graft. It consists of 14 items, 12 items of perioperative factors increased risk for wound infection and 2 items related to types of wound infection. **Preoperative risk factors**consistoffouritems, which include; screening for Methicillin-Resistant Staphylococcus aureus (MRSA), pre-bath, hair removal either clipper or by shaving and administeredprophylaxis antibiotic.**The intraoperative risk factors** consisted of 3 items which include; the type of surgery (elective, emergent, or urgent), administered prophylaxis antibiotic anduse of inotropes. **Postoperative risk factors**consisted of 5 items which include; reoperation, rewiring, ventilation for 24 hours or more, low cardiac output, andadministered appropriate antibiotic as prophylaxis. **Types of wound infection**consist of two items superficial wound infection, deep wound infection, which effect on length of stay in ICU more than 2 days and length of stay in hospital more than 10 days.

Ethical Considerations: letter of approval to collect data:

The researchers obtained information from the electronicmedical record of CABG patients andsince the study is a retrospective approach, there was no harm imposed.The ethical approval is obtainedfrom the faculty of nursing at King Abdul-Aziz University as well as the Ethical Research Committee Unitand passed on to the director of medical recordunit, at KAUH where the privacy of information is ensured.

Content validity:
The content validity of the researchtool part(I)was developed by the researchers to assess demographic characteristics and medical data. A jury of seven experts revised the tools from academic staff from the medical-surgical nursing, and clinical authorities at KAU ascertained it. Their opinions were evoked as regards to the tool format layout, compatibility, data accuracy, congruity, and proficiency. The content validity of the researchtool part(II)standardize in King Abdulaziz University Hospital.

Data Collection Process:
- The present research was carried out within three months starting from February 2016 to April 2016 for CABG patients was registered during the period from January 2011 to December 2013.
- Purpose of the study was simply explained to the manager of electronic medical records who provided an agreement of ethical approval to initiate the data collection process of the patients' electronic medical records.
- The researchers started to collect data from the patient's electronic files. The researchers were attendedat work field at the afternoon from 1:00 -3:00 Pm for three days per week.
- A standardized patient's electronic files were completed for each patient who underwent surgery during the monitoring periods. For CABG with saphenous vein graft, CABG and with internal thoracic arterial graft.

The following characteristics were recorded: age, gender, body mass index, wound class, type of procedure, elective versus urgent or emergent, admission date, date of surgery, discharge date, readmission within the post-discharge period, and development of Infection in a Surgical Site.
- The researchers used all these data toassess the risk factors that contributed to Infection in a Surgical Site among coronary artery bypass graft patients.

Statistical analysis:
The data has been analyzed using SPSS version 16. SPSS is a comprehensive system for analyzing data. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and complex statistical analysis. Data descriptive were represented as frequencies, percentages, and mean ± standard deviation, were used.

III. Results
Table (1)showsthe demographic characteristicsof the patients,which revealed that thetotal number of the studied samples were 120 CABG patients. Most of thepatients 86.7% were males and 13.3% were females.The mean of age for females and male'spatient was61.92 and 60.16 yearsrespectively.The meanof BMI for female and male was 29.44and 28.10respectively.

Table (1): Demographic characteristicsof the coronary artery bypass graft patients(n=120)

Demographic characteristics	CABG Patients	
	No.	%
gender: • Male • Female	104 16	86.7 13.3
Age • Male • Female	M±SD 60.16±8.60 61.92±10.16	
Body Mass Index (BMI) • Male • Female	M±SD 28.10±4.98 29.44±5.60	

Table (2)illustrate the medical data of the coronary artery bypass graft patients**.** Concerning present medical diagnosis, it revealed that 15.8% of the patientswere diagnosed with angina pectoris, while84.2% diagnosed with myocardial infarction. Regarding comorbid diseases, it was documented that 89.2% had hypertensionand80% diabetes mellitus. As regard to smoking habits 74.2% not smoked.**The analyses revealed that 9.2% of the CABG patients stayed in ICU for more than 2 days, and 9.2% stayed in the hospital for more than 10 days.**

Table (2): Medical data of the coronary artery bypass graft patients (n=120)

Medical Data	CABG Patients No.	%
Present medical diagnosis		
- Angina Pectoris (AP)	19	15.8
- Myocardial Infarction	101	84.2
Comorbid diseases		
- Hypertension	107	89.2
- Chronic obstructive pulmonary disease	24	20.0
- Peripheral vascular disease	24	20.0
- Diabetes Mellitus	96	80
Smoking habit		
- Yes	31	25.8
- No	89	74.2
- Length of stay in the intensive care unit more than 2 days.	11	9.2
- Length of stay in the hospital more than 10 days.	11	9.2

Table (3)illustrates the distribution of coronary artery bypass graft patients regarding preoperativepreparation it was found thatall the samples 100% involved in the study sample were negative from MRSA, and 74.2% of the patients bathed preoperatively. It was noted that 50% of the patients were used clipper for hair removal, while 11.7% used the razor. As regards to intraoperative preparation, it shows that 93.3% of the patients had elective surgery, while 2.5% had urgent surgeries and emergent surgeries were4.2%. Concerning postoperative preparation, it was recognized that 3.4% were re-operated, 5%rewired, 3.3% ventilated for 24 hours or more, 2.5% had low cardiac output, and 11.7% was the inappropriate antibiotic administration.

Table (3): Distribution of the patients in relation to the occurrence of infections in the surgical site post coronary artery bypass graft "Preoperative, Intraoperative, Postoperative" (n=120)

Bundle of Infection in a Surgical Site		CABG Patients No.	%
Preoperative			
Screening for Methicillin-resistant Staphylococcus aureus (MRSA)		120	100
Pre-bath		89	74.2
Hair removal has done if needed			
- Clipper		60	50.0
- Razor		14	11.7
Administered prophylaxis antibiotic		120	100
Intraoperative			
Type of Surgery	Elective	112	93.3
	Urgent	3	2.5
	Emergent	5	4.2
Administered prophylaxis antibiotic		120	100
Use of inotropes		43	35.8
Postoperative			
Reoperation for bleeding		4	3.4
Rewiring		6	5
Ventilation ≥24hr		4	3.3
Low cardiac output		3	2.5
Inappropriate antibiotic administration		14	11.7

Table (4) indicates thedistribution of patients after coronary artery bypass graft regarding the types of wound infection (n=120).It was found that 9.1% had an infection in a surgical site, 5.8% hada superficial infection, whereas3.3% deep infection.

Table (4): Distribution of patients after coronary artery bypass graft regarding the types of wound infection (n=120)

Types of wound infection	CABG Patients No.	%
Superficial woundinfection	7	5.8
Deepwound infection	4	3.3
Total	11	9.1

Table (5) describesdemographic characteristics and medical data of the patients post coronary artery bypass graft regarding infected and non-infected wound, it was found that 72.7% of the infected wound patients were male and 27.3% female. The mean age of infected wound and non-infected wound patients was 58 and 60 years respectively. The meanof BMI for infected wound and non-infected wound patients was 32 and 27 correspondingly.

Concerning medical data related to comorbid diseases, it was noted that all patients with Infection in a Surgical Site have diabetes mellitus, 81.85% hypertension, 36.4% chronic obstructive pulmonary disease and 36.4% peripheral vein disease. While 27.3% of patients with Infection in a Surgical Site smoking. The analyses revealed that the mean number of days stayed in ICU of patients with Infection in a Surgical Site was 4.5 day, whereas the mean number of days of non-infected cases was 2.5. However, the mean number of days' lengthy stay in hospital was 15.9 and 10.1 regarding infected and non-infected cases respectively.

Table (5) Distribution of demographic characteristics and medical data of the patients post coronary artery bypass graft regarding infected and non-infected wound (n=120)

Demographic Characteristics and medical data	Infected wound (n=11)		Non-infected wound (n=109)	
	No.	%	No.	%
Gender				
- Males	8	72.7	96	88.1
- Females	3	27.3	14	12.9
Age	**M±SD** 58±12		**M±SD** 60±10	
Body Mass Index	**M±SD** 32±4		**M±SD** 27± 5	
Comorbid diseases				
- Chronic obstructive pulmonary disease	4	36.4	20	18.3
- Peripheral vein disease	4	36.4	20	18.3
- Diabetes Mellitus	11	100	86	78.8
- Hypertension	9	81.8	98	89.9
- Current Smoking	3	27.3	28	25.7
Length of ICU stay more than 2 days	**M±SD** 4.5±1.4		**M±SD** 2.5±0.97	
Length of days in Hospital more than 10 days	**M±SD** 15.9±19.2		**M±SD** 10.1±1.57	

Table (6) illustrated the distribution of bundle infection in a surgical sitein relation to infected and non-infected wound post coronary artery bypass graft, it was found thatall the study samples 100% were negative from MRSA and, administered prophylaxis antibiotic, 81.8% of patients with Infection in a Surgical Site pre-bath, 36.4% were used clipper for hair removal, while 18.2% used the razor. With reference to intraoperative risk factors, it was noted that all the samples 100% involved in the study administered prophylaxis antibiotic, 72.7% of patients with Infection in a Surgical Site have elective surgery, 9.1% urgency surgery and 9.1% emergency surgery.Aboutpostoperative risk factors, 100% of the patients with Infection in a Surgical Site administered inappropriate antibiotic administration, 36.4% re-operation for bleeding, 54.5% rewiring, 36.4% ventilation ≥ 24hr, and 12.5% low cardiac output.

Table (6) Distribution of bundle infection in a surgical sitein relation to infected and non-infected wound post coronary artery bypass graft (n=120)

Bundle of Infection in a Surgical Site	Infected wound (n=11)		Non-infected wound (n=109)	
	No	%	No	%
Preoperative				
Screening for MRSA	0	0	2	1.8
Clipper	4	36.4	56	51.4
Razor	2	18.2	12	11.0
Pre-bath	9	81.8	80	73.4
Administered prophylaxis antibiotic	11	100	109	100
Intraoperative				
Urgency surgery	1	9.1	2	2
Elective surgery	8	72.7	104	95
Emergency surgery	1	9.1	4	4
Administered prophylaxis antibiotic	11	100	110	100
Postoperative				
Re-operation for bleeding	4	36.4	0	0
Rewiring	6	54.5	0	0
Ventilation ≥24hr	4	36.4	0	0
Low Cardiac output	2	12.5	1	0.9
Inappropriate antibiotic administration	11	100	3	2.8

IV. Discussions

The demographic characteristics of the studied samples in the currentresearchshownthatthe majority of the patients were males and less thanone quarter were females; this could be due to the males had heavy smoking. The mean of age for females and males patient was 61.92 and 60.16 years respectively. This result is congruous with *Korol et al.,*[13]*,*which stated that the average age among the CABG patients was 60 to 72 years. *Dissimilar bySi, et al.* [14] who reported that the most male patients were with amean age of 67 years, which is slightly high than that stated by[13]and given study.

With regard to BMI, the meanfor females and males in the current study was29.44and 28.10respectively.The World Health Organization (WHO) categorizes aperson with a BMI of 25 or exceedingas overweight while anindividual with a BMI of 30 is reflected obese [15].Hence, this research displays that an increase in body weight raises the risk of Infection in a Surgical Site between CABG patients. *Similarly,Si et al.,*[14]reported that an increased BMI exceeding 35 is a predictor of Infection in a Surgical Site between the CABG patients.

In relation to medical data, which showed most of the patients diagnosed with myocardial infarction, however, less than a quarter of them diagnosed with angina pectoris. A study by *Ferrari et al.,*[16]*,*which confirmed that angina pectoris is common in females than in males. According to [13]who found that most co-morbidity including congestive heart failure, coronary heart diseases, and myocardial infarction had significant relationships with incidences of Infection in a Surgical Site.

According to thecomorbidity diseases,in the present study,the majority of theCABG patients had hypertension and diabetes. The result of this study is in line with *Rostami et al.,* [17]findings that a medical history of hypertension was also revealeda risk factor for the Infection in a Surgical Site.

The finding of the current study found that around quarterhad COPD and peripheral vascular diseases.Whereas*Go et al.,*[18] documented that PVD is diseases of the peripheral blood vessels such as the peripheral artery disease which comprise the atherosclerosis of the lower extremity arteries, abdominal aorta, and iliac. According to *Diodato&Chedrawy*[19] reported PVD to be a risk factor associated with the infections after CABG surgery. However,*Wang et al.* [20]reported that chronic respiratory diseases are most common in female than in male patients.

As regard tosmoking habit, it wasfound a quarter of the patients smoked. *Saxenaet al.,* [21] indicated that tobacco smoking is a greatdangerissue for coronary artery illness, myocardial infarction, and cardiac disease lead todying, as well as its result on consequences after CABG is not completely clear.

The current study revealed that the number of infected wounds was recorded ninth of the whole sample taken, it was noted that more than fifth was superficial wound infection and less than fourth had a deepwound infection. In fact, this is proven a minor percent. However, even though this research demonstrates that KAUH performs the bundle of Infection in a Surgical Site, other factors affect the surgical wound infection such as diabetes, hypertension, and obesity. Moreover, the most cases of infected surgical wounds were recorded in elective surgeries more than a "three quarter", in spite of elective surgeries having enough time preoperative to get in control of diabetes, and hypertension levels, unlike the urgent and emergent surgeries. This could be due to the health care givers preoccupied with the CABG surgery.

Regarding the preoperative risk factors, all participants involved in the study were sampled and cultured for (negative)MRSA. According to *Ahmed et al.,*[22], MRSA is a type of Staphylococcus aureus that is resistant to different antibiotics including methicillin and has been frequently isolated from surgical sites and other soft tissues, suggesting their role in causing infections following surgery.

Furthermore, the majority of thepatientsin the present study were pre bathed.According to*Injean et al.,*[23] reported that healthcare facilities have a standard pre-operation bathing protocol for all patients. However, the lack of this bathing protocol has been associated with increased risk for the developingInfection in a Surgical Site .

In addition, the present study results revealed that half of the participants have used clipper while few used razor. *Similarly* reported by *Injean et al.,*[23] that the use of clippers for the removal of the hair is obligated with the lower ratio of Infection in a Surgical Site than the use of a razor. Nevertheless,contamination of clippers with a microbial pathogen is determined to enhance serious of the infections.

The finding of the current study found that,antibiotics were administered for wholly patients preoperatively and intraoperative as prophylaxis to prevent Infection in a Surgical Site . Consistent with *Si et al.* [14] who reported that antibiotics are often used as the prophylaxis to prevent the incidence of Infection in a Surgical Site during the CABG surgery.

The present study revealed that intraoperative risk factors, the majority of the patients had elective surgeries. *Webster & Osborne* [24] reported that elective surgery was revealed to be a risk factor of Infection in a Surgical Site associated with a longer preoperative stay. According to *Bryan & Yarbrough*[25], patients scheduled CABG surgery need to be admitted to the hospital the day before surgery because of the increased infection risk associated with the longer preoperative stay. Therefore, the findings of this study are coherent

with the available research evidence that shows that elective CABG surgery increases the risk for the development of Infection in a Surgical Site .

In the current study revealed that more than third of the patients are used inotropes drug. Inotropes are drugs that are used to alter the contraction of cardiac muscles.*Francis et al.,* **[26]** reported that positive inotropes are used to increase the contraction of the cardiac muscles, while the negative inotropes are used to weaken the contraction. In this respect,*Raja et al.,***[27]** mentioned that inotropes are used as indicators of cardiac instability during CABG surgery.

As related to post-operative risk factors,few patients were reoperations and rewiring. According to *Bryan & Yarbrough***[25]**, reoperation is usually carried out in cases of bleeding and is the chief postoperative risk factor for the development of Infection in a Surgical Site among CABG patients. This study is in the same line with **[28]** who reported that the reoperation of the CABG patients remains the most significant postoperative risk factor for Infection in a Surgical Site , as related to deep infections and organ space infections.

In the present study,few patients were showing to postoperative ventilation for 24 hours or more. Other studies confirmed that ventilation for 24 hours or more has remained a significant risk factor for the progress of Infection in a Surgical Site after patients have undergone CABG **[25,29]**.

In thecurrent research, the low cardiac output was measured amonga few patients. In line with *Ding et al.,***[30]**, established low cardiac output is a common complication of the CABG operation and has been associated with high morbidity and death rates as well adrenal failure, myocardial infarction, stroke and the need for reoperation. Since low cardiac output increases the need for reoperation and reoperation increase the risk of SS1 after the grafting, then low cardiac output also increases the risk of Infection in a Surgical Site.

Forinappropriate antibiotic administrationpostoperative,the present study shows that more than a tenth of the patients not administered antibiotics. *Korolet al.,* **[13]**reported that inappropriate antibiotics administration which microorganisms are resistant has been shown to increase the risk of the Infection in a Surgical Site.

The current study revealed that all the CABG patients with infected wound had diabetes mellitus, most of them hypertensive, more than third COPD and PVD, while more than a quarter smoked.Also shown that the mean number of days stayed in ICU of patients with Infection in a Surgical Site was 4.5 days, whereas the mean number of days of non-infected cases was 2.5. However, the mean number of days' length stay in hospital was 15.9 and 10.1 regarding infected and non-infected cases respectively.This could be due to comorbid diseases of the patients, which causes a long period to stay in the hospital regarding infected wound patients. These findings are comparable to those of **[31]** who indicated that diabetes mellitus is most predominant in both female and male CABG patients. Diabetes mellitus increases the risk of atherosclerosis disease and accelerates neointimal hyperplasia, which leads to augmented probabilities of recurrence vascularization and stroke. According to *Hoffman &Tranbaugh***[32]** who reported that uncontrolled diabetes mellitus also exaggerate wound and damage vascular tissues, causes coronary atherosclerosis, and needs long-standing preoperative observing. The current study illustrated that all the infected wound patients had diabetes. Also,*Dohmen et al.,&Korol et al.,***[33,13]**, stated that hypertension has also been reported previously as a preoperative risk factor for the progress of Infection in a Surgical Site after CABG operation.

The study' findings revealed that most of the patients had elective surgery, more than half-rewiring, more than the third had reo-operation for bleeding and ventilation ≥24hr, however more than tenth low cardiac output.According to *Katlandur et al.,* **[34]**also finds a lower number of CABG patients (10% to 20%) require reoperation. However, **[35]**finds a more than one-third of CABG patients undergo reoperations, which is prevalent among smokers and patients with the acute coronary syndrome, DM, hypertension and family history of coronary artery disease. Also study by *Al-Jughiman et al.,***[36]**noted that reoperation is a risk factor leading to higher rates of mortality because of a greater likelihood of developing perioperative MI and LCO.Either finding are confirmed with *Raja et al,.***[27]**, which found CABG patients who carry out, arterial grafts either right internal mammary artery (RIMA) orradial arteryrequired rewiring. However, this study's results were incompatible with*Badr-Eddin et al.,* **[37]**, who found half of the patients undergoing VAC closure required rewiring but no patients getting omental flap required rewiring.

The finding of the current study found that mechanical ventilation is also a significant postoperative risk factor affecting patient experiencing CABG surgery. Which is consistent with*Tawfiq***[38]**who indicates 7% of patients undergoing CABG obtain mechanical ventilation for 24 to 30 hours. In slightly different findings by *Erdil et al.,* **[39]**who indicated a smaller percentage of CABG patients necessitatecontinued ventilation (>25hours), with no significant difference amonggender of patients.

The study' findings revealed that low cardiac outputis an additionalimportant postoperative risk factor. For this study. These findings confirmed by*Kolat et al.,* **[40]**who indicated that few CABG patients exhibit low cardiac output syndrome. *Ding et al.,* **[30]** reported LCO affects the higher proportion of patients experiencing CABG operationespecially among elderly patients with impaired left ventricular function and emergence who presented in emergency conditions.

V. Conclusion

According to the findings of the current study and the researchers conclude that, the use of bundle has to be effective by reducing the occurrence of wound infections but thereby more other risk factors have occurred related to patient condition increase Infection in a Surgical Site among Coronary Artery Bypass Graft Patients like diabetes mellitus, hypertension, obesity, re-operation for bleeding, rewiring, and ventilation ≥24hr. However, the length of ICU stays around 5 days and the length of hospital stay around 16 days regarding infected wound cases.

VI. Recommendations

Future studied of Infection in a Surgical Site should target prompt preoperative intervention and vigilantly monitored of patients with diabetes, hypertension, chronic obstructive pulmonary disease, and peripheral vascular disease. Utilizing selective, evidence-based core policies with attentivelyinterferences that improve wound defense mechanisms in perioperative period will result in a reduced risk of infection in Coronary Artery Bypass Graft Patients.

Acknowledgments

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