Assessment of Nursing Care on Patient's Outcomes after Minimally Invasive and Conventional Cardiac Surgery

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Abstract

In Minimally invasive heart surgery the patient experiences less pain and quicker recovery **Aim:** the study aimed to assess nursing care on patient's outcomes after minimally invasive and conventional cardiac surgery **Patient and method. Design:** descriptive research design was utilized in the study. **Setting:** this study was conducted in the postoperative ICU, Heart Assuit University Hospital. **Sample:** a convenience sample of 60 patients 30 minimally and 30 conventional. **Four tools** have been to utilized to gather the data, **ToolI:** patient's assessment sheet, **Tool II:** Intraoperative assessment sheet, **Tool III:** postoperative assessment sheet and **Tool IV:** patient outcome assessment sheet. **Results:** A number of clinical outcomes were significantly improved with minimally than conventional including pain assessment30.8%, quality of life91.27±3.03,blood transfusion35.1% and length of stay in intensive care unit.was3.04±0.74.**Conclusions:**assessment of nursing care founded that patients with minimally invasive associated with decreased bleeding, blood product transfusion, ventilation time, intensive care unit stay and less pain than conventional group**. Recommendation:** Establishing a standardized protocol for nursing care after cardiac surgery. Repeat this research on a large probability sample acquired from different geographical areas in Egypt.

Keywords: Conventional Cardiac Surgery, Minimally Invasive Cardiac Surgery & Patient's Outcomes.

Introduction

The development of minimally invasive approaches in the cardiac surgical domain is indeed characterized by entirely specific challenges, i.e. the need to achieve both optimal myocardial protection and reliable extracorporeal perfusion (**Speziale, et al., 2015**).

Conventional cardiac surgery is performed via a median sternotomy; the sternum is divided completely from the sternal notch to the xiphisternum. The operation includes cardiopulmonary bypass established by siting cannulas in the right atrium and ascending aorta. In minimally invasive cardiac surgical procedures, there is less tissue trauma and the right atrium is not directly cannulated; conversely, cardiopulmonary bypass and aortic cross-clamp times are longer (**Akowuahet al., 2017**). Increasing interest is being shown in beating heart (off-pump) surgery because, compared with operations performed with cardiopulmonary bypass, off-pump surgery may be associated with decrease postoperative morbidity and reduce total costs. It appears to produce better results than conventional surgery in high- risk patient populations. (**Chassot et al., 2004**)

Minimally invasive heart surgery has been used as an alternative to traditional surgery for the following procedures (Coronary artery bypass graft, mitral valve repair, mitral valve replacement, aortic valve replacement, atrial septal defects and hybrid coronary revascularization).In Minimally invasive heart surgery the chest is not cut open, but rather small incisions are made in the right side of the chest, and the surgeon operates between the ribs. The patient experiences less pain and quicker recovery, while it also gives the surgeon a better view of some portions of the heart versus an open-heart surgery (**Vishwas, et al., 2016).**

Minimally invasive surgery confers many advantages over standard approaches derived largely from the reduced trauma to the chest wall tissues. The benefits of minimally invasive cardiac surgery include smaller incisions, smaller scars, reduced infection risk, less blood loss, less pain, shorter hospital stays. Stays after minimally invasive operations are from 3 to 5 days compared to 5 to 7 days for traditional sternotomy-based cardiac operations, fewer physical restrictions and shorter recovery time (**Salgado, et al., 2016).**

Immediate post-operative care the critical care nurse should be present in the ICU when the patient arrives from the operating room to receive a sign-over from the anesthesiologist and the cardiac surgical team.

During this period the ICU nurses will be transferring the patient to the ICU monitors and checking all lines and infusions. The nurse will then do the initial set of hemodynamic reading. The respiratory technician will place the patient on a ventilator. Unless the patient is unstable it is the best to stay out of the way of the nurses during this period and wait until they are finished with their assessment before examining the patient. (**Mc Gill, 2017**)

Aim of the study
To assess nursing care on patient's outcomes after minimally invasive and conventional cardiac surgery.

Significance of the study
Cardiovascular disease (CVD) is the number one cause of death worldwide and therefore, the major contributor to the burden of disease. In 2008, 30 % of all global deaths (17.3 million) were attributed to CVD. Of these deaths, an estimated 7.3 million were due to coronary artery disease. CVD results from blockage of the coronary arteries by atherothrombosis, which is regularly treated with minimally or non-minimally invasive off- or on-pump cardiothoracic surgery (**Moza, 2015**).

During the year of 2016, the number of patients admitted for cardiac surgery at Assiut University cardiac center was 300 cases.

Research question
What is the nursing assessment of nursing on patient's outcomes after minimally invasive versus conventional cardiac surgery?

Operational definitions
Minimally invasivecardiac surgery
A term used to imply cardiac surgery done with small incisions or with endoscopic procedures. These include parasternal, rightsided partial sternotomy and lower half sternotomy (**Nathaniel & Michael, 2016**). Minimally invasive heart surgery, the chest is not cut open, but rather small incisions are made in the right side of the chest, and the surgeon operates between the ribs. (**Vishwas, et al, 2016**).

Conventional cardiac surgery
A type of incision in the center of the chest that allows access to the heart.

Conventional heart surgery is typically performed on an open heart, therefore requiring both sternotomy (separation of the breastbone) and cardiopulmonary bypass (a heart-lung machine) as it requires the heart to be stopped.

Research design
Descriptive study was utilized to conduct the aim of this study.

Setting of the study
The study was conducted at Assuit university cardiac center in post-operative intensive care unit .consist 12 beds for patients.

Sample
A convenience sample of 60 uncomplicated adult patient male and female underwent cardiac surgery who are admitted to postoperative ICU, this sample was assigned randomly into two groups 30 minimally and 30 conventional.

Pilot study
A pilot study was carried out before starting of data collection to test the feasibility, applicability and the clarity of the study tools on 10% (6 patients) of the sample and the necessary modifications were done. The pilot study patients were included in the study sample.

The overall reliability of the tools was tested using (α) Cronbach's test (.90) for the pilot study results.

Exclusion criteria
Pregnancy, have infective endocarditis, a hematological condition that would affect participation and documented chest wall deformities

Tools
Four tools were used to collect the data in this study and developed by the reviewing of related literature

Tool one: "preoperative patient's assessment sheet"
This tool developed by the researcher to assess the patient conditions to form base line data

Part I:- Assessment of the demographic patient's profile that included Patient's sex and age.

Part II: Assessment of the patient's clinical data which included medical diagnosis and past history

Tool two: "Intraoperative assessment sheet
This tool developed by the researcher to assess the patient conditions during the operation. (**Scott, et al., 2015**)

-Ischemic time, bypass time, and operation time, intraoperative blood transfusion.

Tool three: postoperative assessment sheet
This tool developed by the researcher to assess the patient conditions in the post-operative period. Included two parts (**cheng, et al., 2011**)

Part I: "visual analog scale for pain (**Clark, et al., 2009**)

Item	Score
0-3	Mild
4-6	Moderate
7-10	Severe

*score of 0 (no pain)   *   score of 10 (worst imaginable pain)

Part II: "Quality of life (EuroQoL EQ-5D-3L) (**adopted to Van, 2015**)

Item	Scale
Mobility	1-no problem 2- some problem 3-extrem problem
Self Care	1-no problem 2- some problem 3-extrem problem
Activities	1-no problem 2- some problem 3-extrem problem
Pain	1-no problem 2- some problem 3-extrem problem
Anxiety	1-no problem 2- some problem 3-extrem problem

Tool four "patient outcome assessment sheet
This tool developed by the researcher to assess the patient outcomes included:
(**cheng, et al., 2011**)
Part I: Time to first mobilization: defined as walking independently
Part II: Time to extubation: total number of hours of intubation (to account for re-intubation) and need for analgesia after extubation
Part III: ICU stay (the period that the patient spend in the ICU)
Part IV: Wound infection and requirement for antibiotics.
Part V: Postoperative bleeding and blood transfusion: Blood loss during the first 12 hours after surgery will be recorded. The blood transfusion requirement during the first 48 hours after surgery in all cases will be recorded.
Method of Data collection
Preparatory phase
- Approval to conduct the study was obtained from the hospital responsible authorities in the postoperative cardiac intensive care unit after explanation of the aim of the study.
- Informed consent was taken from the head of cardiac intensive care unit as well as the patients to carry out this study.
- The tools were developed by the researcher based on the relevant literature reviewing.
- The developed tools was tested for the content validity by selected juries of critical care medical and nursing professionals to assess the clarity, feasibility and applicability.
- The tools were tested for clarity and reliability using (α) Cronbach's test (.90) for the pilot study results.
- A pilot study of six patients was carried out in order to assess the clarity and applicability of the tools.
Ethical consideration
1. Research proposal was approved from Ethical committee in the Faculty of nursing.

2. There is no risk for study subject during application of the research.
3. The study followed the common ethical principles in clinical research.
4. Written consent was obtained from patients or guidance that are willing to participate in the study after explaining the nature and the purpose of the study.
5. Confidentiality and anonymity were assured.
6. Study subject have the right to refuse to participate and or withdraw from the study without any rational any time.
7. Study subject privacy was considered during collection of data.
Field work
Sampling was started from the first of April 2018 to March 2019
Implementation phase
- The researcher assessed baseline hemodynamic status for all patients (preoperative, during operation and until discharge from ICU)
- The researcher assessed ischemic time, bypass time and duration of operation for all patients
- Pain was assessed by visual analog scale. Pain is also assessed post-operatively (daily from post-operative day 2 until the patient is deemed 'fit for discharge'), and at follow-up (2 and 6 weeks following discharge).
- Occurrence of bleeding and need for blood transfusion were assessed for all patients.
- Quality of life is assessed for each patient by using the EuroQoL EQ-5D-3L questionnaires at baseline. When the patient was physically unable to complete the questionnaires, the assessment was performed over the telephone; Questionnaires are repeated at 2 weeks and 6 weeks following discharge from hospital.
- The researcher assessed wound infection, time of extubation, and need for analgesia after extubation for all patients
- The researcher assesses length of ICU, mortality for all patients.
Statistical analysis
The collected data were coded then transformed into coding sheets. The results were checked. Then, the data were entered into statistical packing for social science (SPSS) version (20) using personal computer. Output drafts were checked against the revised coded data for typing and spelling mistakes. Finally, analysis and interpretation of data were conducted. Descriptive statistics including frequency, distribution, mean and standard deviation were used to describe different characteristics. P-value is considered significant when p<0.0.

Results
Table (1): Distribution of Sociodemographic data of Studies groups (Conventional, Minimal).

	Type of operation				
	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
Age group					
19 <30 years	5	16.70	6	20.0	
30<40 years	6	20.00	7	23.30	0.846
40<50 years	9	30.00	6	20.00	
more than 50 years	10	33.30	11	36.70	
Mean±SD	43.67±11.78		42.2±13.04		0.649
Sex					
Male	14	46.7	14	46.67	1.000
Female	16	53.3	16	53.33	
level education					
Read & write	6	20.00	8	26.67	
Primary	2	6.67	0	0.00	
Preparatory	6	20.00	2	6.67	0.090
Secondary	14	46.67	12	40.00	
University	2	6.67	8	26.67	
marital state					
Single	4	13.33	5	16.67	1.000
Married	26	86.67	25	83.33	

*Chi-square test,**Statistically Significant difference At P. value<0.01*

Table (2): Distribuation of Medical data of Studies groups (Conventional, Minimal).

	Type of operation				
	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
medical diagnosis					
Mitral valve Stenosis	0	0.0	2	6.67	
Aortic valve replacement	4	13.3	0	0.00	
Atrial septal defect	1	3.3	1	3.33	
Coronary artery bypass graft	11	36.7	11	36.67	
Double valve replacement	4	13.3	0	0.00	0.039*
mitral valve replacement	9	30	11	36.6	
sever pulmonary stenosis	1	3.3	0	0.00	
Tricuspid Value replacement	0	0.0	2	6.67	
Ventricle septal defect	0	0.0	3	10.00	
past history risk factor for cardiac disease					
Non	12	40.00	11	36.67	
Hypertension	0	0.00	1	3.33	
Diabetes	4	13.33	5	16.67	0.879
Rheumatic Heart	13	43.33	12	40.00	
Diabetes & Hypertension	1	3.33	1	3.33	

*Chi-square test *Statistically Significant difference At P. value<0.05.independent T- test *Statistically Significant difference At P. value<0.05*

Table (3): Distribuation of intraoperative data and blood transfusion For Studies groups (Conventional, Minimal).

	Type of operation				
	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
operation time	7.07±1.08		6.2±0.61		**<0.00****
Ischemic time	83.62±30.75		85.71±15.43		0.795
bypass time	150.97±151.94		117±22.61		0.367
Blood transfusion					
Plasma	27	90.0	24	80.0	0.469
Mean±SD	675.93±167.2		562.2±132.9		**0.010***
Blood	17	56.7	13	43.3	0.438
Mean±SD	676.4±146.9		596.16±162.61		0.175

Chi-square test *Statistically Significant difference At P. value<0.05,**Statistically Significant difference At P. value<0.01

Table (4): Relationship Between Studies groups According topostoperativebleeding and blood transfusion

	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
post-operative bleeding					
Yes	8	26.7	1	3.3	**0.026***
No	22	73.3	29	96.7	
Blood transfusion					
Day of operation					
Plasma(No.patient)	19	63.3	11	36.7	0.070
Amount	465.8±214.1		350.0±187		0.135
Blood(No.patient)	20	66.7	11	36.7	0.038*
Amount	447.5±240.3		363.6±130.6		0.218
Day1Post Surgery					
Plasma(No.patient)	4	13.3	2	6.7	0.667
Amount	500.0±0		250±0.0		-
Blood(No.patient)	10	33.3	5	16.7	0.233
Amount	370.0±137.8		350.0±136.9		0.795

*Statistically Significant difference At P. value<0.05,

Table (5): Comparison between Studies groups According to Mechanical ventilation Parameters.

Day of operation	Conventional(n=30)		Minimal(n=30)		P. value
	Mean±SD		Mean±SD		
Rate	14.07±1.34		13.47±1.17		0.069
Fio2 (fraction inspiratory oxygen)	61.67±10.85		59.67±9.64		0.454
Peep (positive end expiratory pressure)	6.07±3.72		5.1±0.55		0.165
Ps (pressure support)	9.03±1.13		8.47±0.86		0.033*
duration of mechanical ventilation	3.43±1.22		2.4±0.72		**<0.001****
Vt (tidal volume)	466.67±42.21		473.33±59.79		0.620
mode	No	%	No	%	
SIMV	30	100	30	100	-
re intubation					
Yes	6	20.0	0	0.0	0.031*
No	24	80.0	30	100.0	

Day of operation	Conventional(n=30)		Minimal(n=30)		P. value
	Mean±SD		Mean±SD		
need for analgesia after extubation					
Yes	25	83.3	17	56.67	**0.047***
No	5	16.7	13	43.33	
Name of analgesia					
epicotil	3	10.0	4	13.3	0.170
ketolac	17	56.7	13	43.3	
Lidocaine	0	0.0	1	3.3	
Nalfon	2	6.7	0	0.0	
ICU stay	3.66±0.61		3.04±0.74		<0.001**

*Chi-square test *Statistically Significant difference At P. value<0.05,*
*Statistically Significant difference At P. value<0.05, **Statistically Significant difference At P. value<0.01*

Table (6): Relationship Between Studies groups According to Pain assessment.

	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
Day of operation					
Mild	3	6.9	4	7.7	<0.001**
Moderate	2	6.9	18	61.5	
Sever	25	86.2	8	30.8	
Day1					
Mild	2	6.7	15	50.0	0.001**
Moderate	21	70.0	9	30.0	
Sever	7	23.3	6	20.0	
Day2	**n=28**	**%**	**n=25**	**%**	
Mild	7	25.0	18	72.0	0.003**
Moderate	20	71.4	7	28.0	
Sever	1	3.6	0	0.0	
Day3	**n=18**	**%**	**n=7**	**%**	
Mild	15	83.3	7	100.0	0.515
Moderate	2	11.1	0	0.0	
Sever	1	5.6	0	0.0	
Day4	**n=3**	**%**	**n=1**	**%**	
Mild	2	66.7	1	100.0	0.505
Moderate	1	33.3	0	0.0	

*Chi-square test **Statistically Significant difference At P. value<0.01,*
Note:
Number of patient discharge in day 2 (5 minimally - 2 conventional)
Number of patient discharge in day3 (23 minimally- 12 conventional)
Number of patient discharge in day 4 (29 minimally – 27 conventional)

Table (7): Relationship between Studies groups According to quality of life and VAS 2 week Post Surgery.

2 Weak post surgery	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
Mobility2week					
No problem	1	3.3	12	40.0	
Some problem	26	86.7	18	60.0	**0.001****
Extreem problem	3	10.0	0	0.0	
SelfCare2w					
No problem	1	3.3	9	30.0	
Some problem	25	83.3	21	70.0	**0.005****
Extreem problem	4	13.3	0	0.0	
Activities2w					
No problem	1	3.3	9	30.0	
Some problem	27	90.0	21	70.0	**0.010***
Extreem problem	2	6.7	0	0.0	
Pain2w					
No problem	1	3.3	10	33.3	
Some problem	29	96.7	20	66.7	**0.003****
Anxiety2w					
No problem	1	3.3	5	16.7	
Some problem	29	96.7	25	83.3	0.085
scale2w	79.33±5.68		81.5±8.11		0.236

Chi-square test *Statistically Significant difference At P. value<0.05,**Statistically Significant difference At P. value<0.01

Table (8): Relationship between Studies groups According to quality of life and VAS 6 week Post Surgery.

6 Weak post surgery	Conventional(n=30)		Minimal(n=30)		P. value
	n.	%	n.	%	
Mobility					
No problem	30	100.0	30	100.0	-
SelfCare					
No problem	30	100.0	30	100.0	-
Activities					
No problem	9	30.0	29	96.7	
Some problem	21	70.0	0	0.0	**<0.001****
Pain					
No problem	22	73.3	30	100.0	
Some problem	8	26.7	0	0.0	**<0.001****
Anxiety					
No problem	19	63.3	30	100.0	
Some problem	11	36.7	0	0.0	**<0.001****
scale6w	88.17±3.34		91.27±3.03		**<0.001****

Chi-square test **Statistically Significant difference At P. value<0.01

Table (9): Assessment of Nausea and vomiting for studies groups.

	Conventional(n=30)		Minimal(n=30)		P. value
	n.	**%**	**n.**	**%**	
Nausea (yes)	13	43.3	2	6.9	0.022**
Frequency (Mean±SD)	2.69±0.63		1.67±0.58		
Vomiting (yes)	11	36.7	4	13.8	0.073
Frequency (Mean±SD)	1.82±0.6		1.75±1.5		0.898

*independent T- test*Statistically Significant difference At P. value<0.05,*
*Chi-square test *Statistically Significant difference At P. value<0.05.*

Table   (1):   Shows   the sociodemographiccharacteristics of the two groups. Regarding to the age it was found that the means ±SD in conventional group was 43.67±11.78 , the means±SD in minimally group was   42.2±13.04. Regarding to the sex it was found that males and females were equal in both group.   The majority of both groups were educated and having secondary degree it was 51.9% in conventional and 42.86% in minimal .for marital status the highest percentage were married it was 89.7% in conventional and 86.2% in minimally .

Table (2): Shows the medical data for both groups. Regarding to medical diagnosis it was found that the major medical diagnosis in both group (conventional and in minimally) were CABG, MVR, DVR, AVR, VSD, MVS, TVR, ASD .regarding to the significance, there were statistical difference between both groups. For the past history and risk factor of cardiac disease the results revealed that the majority of patients in both groups had no past history, while (43.3%) of the conventional had rheumatic heart and (40%) of the minimally also rheumatic heart. There was no statistical difference between both groups.

Table (3): Shows intraoperative assessment of both groups. . In the relation between two groups according the operation times the results revealed that the means ±SD in conventional group was 7.07±1.08, and the means ±SD in minimally invasive was 6.2±0.61. There were statistical differences between both groups. For ischemic time and bypass time there were no statistical difference between both groups .regarding to plasma it was found that the major of all patients that had taken plasma intraoperation were 90% in conventional , and 64.9% in minimally .

Table (4): Shows the relation between both groups For post-operative bleeding it was found that the major of the patients had no post-operative bleeding only (26.7%) of the conventional group had bleeding while in minimally (3.3) . regarding to significance there were statistical significance difference between both groups. regarding to patients that had taken plasma   at the day of operation were 48.7% in conventional , and 50% in minimally . at the day

1patients that had taken plasma were 28.6% in conventional , and 28.6% in minimally . regarding to significance   there   were   statistical significance difference between both groups during intra-operation . Regarding to blood it was found that the major of all patients that had taken blood intra-operation were38.6% in conventional, and 35.1% in minimally .while patients that had taken blood at the day of operation were 51.3% in conventional .

Table (5): Shows that all patients of both groups were on SIMV mode .there were significance difference between both groups as regard to re intubation,   20%   in   conventional   while   in minimally0.0%. There were significant difference between both groups as regard to duration of mechanical ventilation .Regarding to the need for analgesia after extubation   the result revealed that the majority of patients in both groups had taken analgesia, 83.3 % in conventional , and 56.6% in minimally. Regarding to the intensive care unit stay it was found that the means ±SD in conventional group was 3.66±0.61 and the means ±SD in minimally invasive   was3.04±0.74.   Therewere   statistical differences between both groups.

Table (6): This table demonstrates that, there was statistical significance difference between both groups according to pain assessment at day of operation, day1and day2. 86.2% in conventional had sever pain, and 30.8% in minimally at day of operation.

Table (7): This table show that, assessment of quality of life 2 weeks after surgery were statistical significant at mobility, self care, activities and pain. whilenon statistical significant difference as regard to anxiety .

Table (8): This table show that, assessment of quality of life 6 weeks after surgery were statistical significant at activities, pain and anxiety. Regarding to mobility and self care all patients of both groups had no problem. as regard EQ VAS scale 6 weeks after surgery . The highest mean was 91.27±3.03 in minimally, and in conventional was 88.17±3.34.

Table (9): Enumerate that assessment of nausea of both groups were significant difference 43.3 % in

conventional and 6.9 % in minimally .while the mean score was 2.69±0.63 in conventional , 1.67±0.58 in minimally as regard to frequency of nausea

Discussion

Cardiac surgery is the specialty of medicine concerning the surgical treatment of pathologies related to the heart and thoracic aorta. The spectrum of modern cardiac surgery can be understood by its history beginning at the end of the 19th century. Since then cardiac surgery developed through the work of numerous dedicated surgeons offering more and more treatments for diverse cardiac pathology. This development is still ongoing today. Surgical revascularization is one option to relieve ischemic heart disease with complicated atherosclerosis **(David & Lawrence, 2017).**

Based on the results of this study, the mean age of the group who perform minimal cardiac surgery was younger than patients of the group who done conventional cardiac surgery with no statistically significant difference between both groups as regard to age. And this result is in the same line with the **(Svensson, et al., 2015)** who noticed that the patient who underwent minimally invasive cardiac surgery were younger than the patient underwent conventional surgery but **(Yamada, et al., 2013)** disagree with this study and show that the mean ± SD of the minimally invasive cardiac surgery patient is higher than conventional patients.

As regard to sex, this study revealed that there is no significant difference among both groups and this result is confirmed by **(Ahmed, et al., 2018)** who noticed that the gender has no effect on the choice of cardiac surgery type.

The present study demonstrated that there was a highly significant difference between both groups regarding to the level of education and this result agree with **(Bjørnnes, et al., 2018)** who revealed that increasing the level of education help for seeking medical help and early detection and management of cardiac disease.

As for marital status, the present study shows no significant difference between both groups in relation to marital status and this result is in divorce with the results of **(Bjørnnes, et al., 2018)** who found that the majority of patients underwent the conventional cardiac surgery were married.

Concerning the results of current study, the most common diagnosis for cardiac surgery is coronary artery bypass graft and mitral valve replacement with a highly significant difference between both groups and this result disagree with **(Svensson, et al., 2015)** who found that the most common indication for

cardiac surgery were degenerative changes of the cardiac valves and ischemic heart diseases.

Regarding to past history of cardiac diseases the results supported by **(Yamada, et al., 2013)** who showed that diabetes mellitus or hypertension not affect the type of cardiac surgery. but these results confused with **(Cakir, et al., 2018)**who showed that the rheumatic heart disease, diabetes mellitus and hypertension are most common noncardiac causes for cardiac surgery.

The present study denoted that the patient underwent minimally invasive surgery used pain analgesia by level lower than patient had conventional cardiac surgery this may be due to the small incision of the wound and this result agreed with the results of **(Kenan, et al., 2017)** who found a significant difference related to analgesic usage after extubation.

According to the total bypass time there was significant difference between the both groups this result matches with the results of **(Shawky, et al., 2016)**but disagree with **(Ahmed, et al., 2018)** who noticed that there was significant difference in relation to the bypass time between the minimal invasive and the conventional cardiac surgery.

The total operation time of the minimally invasive procedures is generally longer than the time required for conventional surgery and this may be due to the new experiences in this minimally invasive surgery and the narrow field of MIMVS and this result is supported by **(Shawky, et al., 2016)** & **(Mark, et al., 2016)** who revealed a highly significant difference between both groups regarding to total operation time.

The present study demonstrated that the post-operative bleeding occurs at higher rates in the group underwent conventional surgery than the patients had minimal invasive cardiac surgery and this may be due to less traumatic nature of the minimally invasive and this result approved by **(Jitumoni, et al., 2017)** who demonstrate that there was a highly significant difference between both groups related to post-operative blood loss.

The present study revealed that the length of ICU stay of the minimally invasive group is shorter than the period spent in the ICU for the conventional group and this result is in line with **(Thomas, et al., 2015)** who showed a significant difference related to length of ICU stay but these results disagree with **(Mark, et al., 2016)** who noticed that there was no significant difference related to postoperative length of stay.

Based on the results of this study, there was a significant difference between both groups related to intraoperative blood transfusion and this result agreed with **(Saif, et al., 2018)** who found that The

minimally invasive cardiac surgery patients had a lower average incidence of intra and postoperative transfusion of blood.

The present study reported that the total amount of blood transfused postoperatively for conventional surgery is higher than which transfused to patient underwent minimally invasive surgery and this result is in the same line with **(Lars, et al., 2014)** who found a significant difference in relation to the blood transfusion after operation.

Concerning the time of ventilation, the present study revealed that the time of positive pressure ventilation in minimally invasive group is clearly shortly than the time for conventional group and this result matches with the result of **(Ward, et al., 2013)** who noticed that there was a highly significant difference in relation to the ventilatory time.

As regard to the need for reintubation the present study reported that about quarter of the conventional group were reintubated and this result supported by findings of the**(Shawky, et al, 2016)**who reported a significant difference related to the need for reintubation between both groups but, these finding disagree with

(Michael, et al., 2016) who demonstrate no significant difference regarding reintubation for both groups.

Pain levels for minimally invasive surgery is less intensive compared to conventional group and about two thirds of the highly tolerated pain level were moderated at the second day after operation so this result agreed with the results of **(Thomas, et al., 2015)** and **(Shawky, et al., 2016)** who noticed that there was a significant difference related to pain between the both groups.

During assessment period after surgery by **2 weeks**, the current study noticed that the minimal invasive group were adapted to the postoperative status more than the conventional group as they mobile easier, having lower level of pain and anxiety and about two thirds return to their normal activities with some problems and after **6 weeks,** the significant difference was related to pain , anxiety and activities these results is confirmed with the results of **(Schweikert, et al., 2016)** who noticed a statistical difference among the studied groups EQ-5D health questionnaire.

When comparing the EQ-VAS between the data of the 2nd and 6th week after the surgery, the present study demonstrated that there was statistical difference between both groups related to the 6th week postoperatively.

The present study assessed the gastrointestinal tract and reported that the most common GIT complications after cardiac surgery was nausea with

significant difference between minimal invasive and conventional cardiac surgery but **(Michael, et al., 2016)** disagree with these results as they found that the most common GIT complications was gastric bleeding and **(Paul, et al., 2015) reported** that there was no statistically significant difference in relation to GIT complications and cardiac surgery.

Conclusion

assessment of nursing care founded that patients with minimally invasive associated with decreased bleeding, blood product transfusion, ventilation time, intensive care unit stay and less pain than conventional group.

Recommendation

1. Establishing a standardized protocol for nursing care after cardiac surgery.
2. Repeat this research on a large probability sample acquired from different geographical areas in Egypt.

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