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POSTOPERATIVE CARDIAC SURGERY COMPLICATIONS AND HOSPITAL LENGTH OF STAY

COMPLICAÇÕES PÓS-OPERATÓRIAS CARDIOCIRÚRGICAS E TEMPO DE INTERNAÇÃO

COMPLICACIONES POSTOPERATORIAS DE LA CIRUGÍA CARDÍACA Y TIEMPO DE INTERNACIÓN

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ABSTRACT

***Objective*:** to associate the main complications experienced by patients submitted to cardiac surgery and the length of stay in a Cardiac ICU. ***Method*:** this was a quantitative, cross-sectional study using descriptive and correlation designs. We identified medical records of patients undergoing cardiac surgeries and those who were in the postoperative period in the Intensive Care Unit. Multivariate Linear Regression test was used for THE analysis and THE prediction of independence between variables. ***Results*:** twenty-six out of 103 patients submitted to cardiac surgeries presented postoperative complications. The most prevalent complications were cardiac, pulmonary, and infectious ones. Nine patients died. The most prevalent previous disease was systemic arterial hypertension. Regarding the hospital length of stay, the predominance was ONE to THREE days, followed by THREE to six days. ***Conclusion*:** The hospital length of stay ranged from ONE to THREE days long. This STUDY showed that planning is essential to set up the patient's discharge as early as possible, as well as to reduce the hospital length of stay and potential complications. ***Descriptor*:** Complications; Thoracic Surgery; Patients; Length of Stay; Discharge Plannings; Intensive Care Unit.

RESUMO

Objetivo*:** associar as principais complicações com pacientes submetidos à cirurgia cardíaca e o tempo de internação. ***Método*:** estudo quantitativo, transversal, descritivo e correlacional, para identificar os registros médicos de pacientes submetidos a cirurgias cardíacas e aqueles no pós-operatório na Unidade de Terapia Intensiva. O teste de Regressão Linear Multivariada foi utilizado para a análise e a previsão de independência entre as variáveis. ***Resultados*:** dos 103 pacientes submetidos a cirurgias cardíacas, 26 apresentaram complicações pós-operatórias. As complicações mais prevalentes foram cardíacas, pulmonares e infecciosas. Nove pacientes morreram. A doença anterior mais prevalente foi hipertensão arterial sistêmica. Em relação aos dias de hospitalização, o predomínio foi de um a três dias, seguido de três a seis dias. ***Conclusão: a revascularização miocárdica foi a principal cirurgia realizada, seguida de endarterectomia e as complicações observadas foram cardíacas, seguidas das pulmonares. A duração hospitalar dos pacientes variou de um a três dias. Este estudo mostrou que é imprescindível o planejamento da alta do paciente o mais precocemente possível para a diminuição do tempo de internação e possíveis complicações. ***Descritores*:** Complicações; Cirurgias Cardíacas; Pacientes; Tempo de Internação; Tempo de Internação; Alta do Paciente; Unidade de Terapia Intensiva.

RESUMEN

Objetivo: Asociar las principales complicaciones con pacientes sometidos a la cirugía y con el tempo de internación. ***Método:*** Estudio cuantitativo, transversal, descriptivo y correlacional del banco de datos del hospital para identificar los registros médicos de pacientes sometidos a cirugías torácicas y de aquellos en el postoperatorio en la Unidad de Cuidados Intensivos. Se utilizó la prueba de Regresión Lineal Múltiple para análisis y predicción de independencia entre las variables. ***Resultados***: De los 103 pacientes sometidos a cirugías torácicas, 26 presentaron complicaciones postoperatorias. Las complicaciones más prevalentes fueron las cardíacas, las pulmonares y las infecciosas. Nueve pacientes murieron. La enfermedad anterior más prevalente ha sido la hipertensión arterial sistémica. Acerca de los días de hospitalización, el período predominante fue de UNO a TRES días, seguido de TRES a SEIS días. ***Conclusión***: La cirugía de revascularización coronaria ha sido la principal cirugía, seguida de la endarterectomía, y las complicaciones observadas fueron las cardíacas, seguidas de las pulmonares. El tiempo de internación de los pacientes varió de UNO a TRES días. Eso ESTUDIO ha mostrado que es imprescindible planificar el egreso del paciente lo más temprano posible, para reducción del tiempo de internación y de las posibles complicaciones. ***Descriptores***: Complicaciones; Cirurgía Torácica; Pacientes; Tiempo de Internación; Alta del Paciente; Unidades de Cuidados Intensivos.

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INTRODUCTION

It is known that chronic non communicable diseases (CNCDs) are a global public health problem(1). Among them, cardiovascular diseases are the main cause of death, accounting for 17.5 million or 46.6%. The others are cancers (8.2 million or 21.7%), respiratory diseases, including asthma and chronic obstructive pulmonary disease (4.0 million or 10.7%), and diabetes (1.5 million or 4%). These four diseases account for 82% of CNCDs deaths.[2]

It has been reported through the World Health Organization (WHO), in the monitoring report for 2015, reports that annually 16 million people die prematurely before age 70 due to CNCDs. Four out of five of these deaths occur in developing countries, one of the major development challenges of the 21st century.[3] Studies report that CNCDs account for 20% of deaths in individuals over 30 years of age, and cardiovascular diseases account for 80% culminating often with the need for surgical intervention.[4]

It is noted that as a consequence of the worsening of atherosclerotic coronary disease, the elderly is strong candidates for myocardial revascularization.[5] With the increasing life expectancy of the population, public and private health systems have developed effective measures in the prevention and the treatment of these diseases.[6] With the advancement of health research, many patients benefit from minimally invasive approaches in the treatment for cardiovascular disease (CVD). However, cardiac surgery may still be the only treatment indicated and available for a large number of patients.[7]

It is pinpointed that there are a number of indicated and available clinical treatments for heart disease, and although they are expanding, there are cases in which surgical intervention becomes the most appropriate and effective option.[7] Cardiac surgeries are major surgeries and have a high degree of complexity, once they alter physiological mechanisms, which causes a critical state. Therefore, patients need postoperative intensive care for their recovery.[8] In some cases, it may be necessary to use vasoactive drugs and mechanical ventilation, leading to a longer hospital length of stay.[9,10]

It has been considered that the Hospital Length of stay (LOS) is an important quality indicator in health institutions, being related to the patient's mortality index.[8] In Brazil, hospital LOS is measured by the patient's hospitalization period, reflecting factors such as intra- and postoperative complications of cardiac surgeries that may increase patients' hospital LOS.[11]

It must be understood that, despite the evolution in surgical techniques and procedures, as well as in postoperative care, some complications are still frequent. The most prevalent and reported in studies are acute myocardial infarction (AMI), congestive heart failure (CHF), pulmonary, neurological, infectious, and renal complications.[10,12]

OBJECTIVE

- To associate the main complications occurred with patients submitted to cardiac surgery and the hospital length of stay.

METHOD

It has been carried out a quantitative, cross-sectional study using descriptive and correlational designs performed in a teaching hospital, located in the inland of São Paulo State. We performed a review of electronic medical records retrieved from the MV PEP 2.0 system, which consists of a network of clinical and care information stored in the institution's database. The study was carried out from July to December 2015. We retrieved 103 medical records of patients submitted to cardiac surgery.

It has been used to collect data, an instrument containing variables such as gender, age, employment status, discharge type, length of hospital stay, and city of origin, previous illness, and intubation (yes/no), diagnoses, surgeries and postoperative care. Methods of descriptive and inferential statistics were used to analyze probabilistic questions based on the sample data. Eventually, given the need for better understanding, the following methods were used: mean, fashion, standard deviation, multiple linear regression, Pearson's correlation, R Square, significance and standard error. Multivariate Linear Regression Test was used to analyze independence and prediction between variables.

It has been compiled the results of independence between the proposed variables through the analysis between the *p*-value. All analyzes were performed using the Statistical Package for the Social Sciences Statistics Software, linked to the functionalities of the Microsoft Excel®, version 2016. The research was approved by the Ethics and Research Committee, Opinion nº 1,716,713; CPEC 59111716.7.0000.5415.

RESULTS

It has been shown through sociodemographic data of our sample of 103 patients, that 67 (65.05%) were male. The most prevalent age group was between 51 and 70 years, followed by 31 to 50, with a mean of 65 ± 2.16 and 18 ± 2.64 years, respectively. Regarding professional occupation, 57 (55.34%) were retired or stayed at home. The remaining patients had activities diversified, according to Table 1.

Table 1. Sociodemographic profile of patients submitted to cardiac surgery. São José do Rio Preto, São Paulo, Brasil, 2017.

Gender	N	%	SD	SE
Male	67	65.05	21.92	2.16
Female	36	34.95		
TOTAL	103	100.00		
		Age		
18 a 30 years	5	4.85	26.75	2.64
31 a 50 years	18	17.48		
51 a 70 years	65	63.11		
> 70 years	15	14.56		
TOTAL	103	22.33		
		Employment		
Active	46	44.66	7.78	0.77
Inactive	57	55.34		
TOTAL	103	100.00		

SD = Standard Deviation; SE = Standard Error

It has been displayed as shown in Table 2, that the main surgeries were myocardial revascularization (n = 50, 48.54%), followed by endarterectomy (n = 12, 11.65%).

Table 2. Types of cardiac surgeries. São José do Rio Preto, São Paulo, Brasil, 2017.

Surgeries	**N**	**%**	**SD**	**SE**
Repair of Aortic Aneurysm	4	3.88	**12.66**	**1.25**
Repair of Atrial Heart Septal Defect	2	1.94		
Repair of Type A Aortic Dissection	9	8.74		
Repair of Pulmonary Artery Fistula+Draiunage	1	0.97		
Endarterectomy	12	11.65		
Abdominal Aorta Endoprosthesis	2	1.94		
Artificial Pacemaker Implantation	2	1.94		
Heart Valve Prosthesis Implantation	6	5.83		
Myocardial Revascularization	50	48.54		
Thoracotomy	1	0.97		
Mitral Valve Replacement	3	2,91		
Pulmonary Valve Replacement	3	2.91		
Aortic Valve Replacement	4	3.88		
Aortic and Mitral Valve Replacement	4	3.88		
TOTAL	**103**	**100.00**		

SD = Standard Deviation; SE = Standard Error

It has been added that the hospital length of stay ranged from ONE to THREE days (n = 59; 57.28%) to THREE to SIX days (n = 29; 28.16%). Only 15 patients (14.56%) have been hospitalized for more than six days.

It has been noted that regarding the previous diseases presented by the patients, the most common was high blood pressure (HBP) (n=33, 32.04%), followed by acute myocardial infarction (AMI) (n=16; 15.53%), as shown in Table 3.

Table 3. Previous diseases of patients undergoing cardiac surgery. São José do Rio Preto, São Paulo, Brasil, 2017.

Previous Disease	N	%	DP	EP
CVA	9	8.74	**9.11**	**0.90**
Câncer	2	1.94		
DLP	12	11.65		
DM	12	11.65		
COPD	1	0.97		
APE	1	0.97		
HBP	33	32.04		
HBP+CVA	1	0.97		
MI	16	15.53		
AKI	1	0.97		
CKD	4	3.88		
None	8	7.77		
Smoker	3	2.91		
Total	**103**	**100.00**		

VCA =Cerebral Vascular Accident; DLP = dyslipidemia; DM = Diabtetes Mellitus; COPD = Chronic Obstructive Pulmonay Disease; APE = Acute pulmonary edema; HBP = High Blood Pressure; MI = Myocardial Infarction; AKI = Acute Kidney Injury; CKD = Chronic Kidney Disease
SD = Standard Deviation; SE = Standard Error

It has been pointed out that regarding intubation, 68 patients (66.02%) remained intubated, and only EIGHT (7.77%) died. The main diagnoses were acute coronary disease (CAD) (n=20; 19.42%), followed by carotid stenosis (n=12; 11.65%), as shown in Table 4.

Table 4. Main diagnoses of patients undergoing cardiac surgery. São José do Rio Preto, São Paulo, Brasil, 2017. (N=103)

Diagnoses	N	%	SD	SE
Aortic Aneurysm	4	3.88	**4.86**	**0.48**
Thoracic Aortic Aneurysm	2	1.94		
Unstable Angina	5	4.85		
Atrial Heart Septal Defect	2	1.94		
Pericardial Effusion	2	1.94		
Type A Aortic Dissection	9	8.74		
Acute Coronary Heart Disease	20	19.42		
Multiarterial Acute Coronary Heart Disease	9	8.74		
Chest Pain	1	0.97		
Infective Endocarditis	5	4.85		
Subacute Endocarditis	1	0.97		
Aortic Valve Stenosis	4	3.88		
Carotid Stenosis	12	11,.65		
Pulmonary Valve Stenosis	3	2.91		
Coronary Artery Fistula	1	0.97		
ST Elevation Myocardial Infarction	9	8.74		
Congestive Heart Failure	8	7.77		
Acute Coronary Syndrome	5	4.85		
Left Intra-Atrial Thrombus	1	0.97		
TOTAL	**103**	**100.00**		

SD = Standard Deviation; SE = Standard Error

It has been observed that with regard to postoperative complications, cardiac diseases were the most prevalent (n=16; 15.53%), followed by pulmonary diseases (n=4; 3.88%), and infectious diseases (n=3; 2.91%), as shown in Table 5.

Table 5. Postoperative complications of patients undergoing cardiac surgery. São José do Rio Preto, São Paulo, Brasil, 2017.

Postoperative Complications	N	%	DP	EP
No complications	77	74.76	**16.53**	**1.63**
Arrhythmia, PCR	1	0.97		
CVA	1	0.97		
Bradycardia, PCR	3	2..91		
Cardiogenic Shock	1	0.97		
Pleural Effusion	1	0.97		
Blood Coagulation Disorder	1	0.97		
AF, PCR	1	0.97		
AF	2	1.94		
FV, PCR	1	0.97		
Hemodialysis/Renal Dialysis	1	0.97		
Hypervolemia	1	0.97		
AMI	1	0.97		
Infection	3	2.91		
Respiratory Insufficiency	2	1.94		
PCR	1	0.97		
Delayed Peripheral Perfusion	1	0.97		
Worsening of Kidney Function	1	0.97		
Pneumothorax	1	0.97		
Cardiac Tamponade	1	0.97		
TV, FV, PCR	1	0.97		
TOTAL	**103**	**100.00**		

SD = Standard Deviation; SE = Standard Error

PCR = Polymerase Chain Reaction; CVA = Cerebral Vascular Accident; AF = Atrial Fibrillation; VF = Ventricular Fibrillation; AMI = Acute Myocardial Infarction; VT = Ventricular Tachycardia

It has been noticed when analyzing the coefficient of dependence ($p<0.005$) between variables and complication in the PO period that there was significant statistical dependence with previous diseases ($p=0.009$) and intubated patients ($p=0.044$). There was no statistical significance among the variables, sex, age, and occupational occupation with the types of complications during the PO period.

It has been verified that after analyzing data that the inferential crossover between the variables "postoperative complication" and "sociodemographic data" presented no significant statistical evidence. However, when the variables "PO complications" and "clinical data" were crossed, the results showed that "complication in the PO" x "type of discharge" and "complications in the PO" x "hospitalization time" presented statistical evidence of dependence, with a significance level of ($p=0.000$).

It has been followed in the context of the Pearson correlation analysis the same logic observed in the degree of dependence pointed out after the application of the Multivariate Linear Regression; that is, there is a significant correlation in both cases, "complication in the PO" versus "type of discharge "Presents a moderate and positive correlation (0.499) and significance ($p=0.000$).

It has been noted when we related "Complications at PO" versus "Length of hospitalization," The same parameters as above, but with a variation on the correlation value (0.410). Therefore, it is understood based upon the information that the greater the incidence of postoperative complication is, the more susceptible to death the patient is. Likewise, the longer the patient's hospitalization time is, the more exposed he will be to complications.

DISCUSSION

It has been found from 103 patients' medical records and their results, a predominance of males in relation to females, corroborating the literature, in which similar data are verified. Of these, we can exemplify the study carried out at a hospital in Fortaleza-CE, on the demographic characteristics of patients undergoing myocardial revascularization, in which 62.8% of the patients were male, and only 37.2% of the female.[13] One can explain this predominance, due to the risk factors to which men and women are exposed today.[14]

It has been highlighted that the age group ranged from 51 to 70 years, in other words, there is a predominance of elderly according to the increase of the population in the age pyramid of the country. According to the projections published by the United Nations for 2050, Brazil will have an age group population similar to the developed countries, with 45.0% of people over 45 years of age and 19.8% of people over 65 years of age.

It has been attained correlating the age and professional occupation, a figure of 45 (43.68%) patients who were active in the job market, working as merchant, driver, bricklayer, nursing assistant, among others, and 43 (41.74%) were retirees. This can be explained by the increase in the Brazilian elderly population, and consequently, an increase in labor market participation.[15]

It has been shown that the most found risk factors or previous diseases were HBP (n=82; 79.61%), DM (n=37; 35.92%), and CAD (n=21; 20.38%). Similar data were found through a study on the epidemiological profile of myocardial revascularization surgeries in 2011, which showed a prevalence of HBP (88.3%), followed by CAD (50.4%), and DM (32.9%).[13]

It has been recorded that HBP is one of the main contributing factors in the formation of atherogenic plaques, increasing by two to three times the risk of cardiovascular events. In Brazil, it is considered the main cause of systolic heart failure.[16]

It has been supplemented that increased body weight, population growth, and longer life expectancy make DM a major risk factor. This is critical because the mortality rate of diabetic patients is higher than that of the general population. In the Elsa-Brazil study (2008-2010), the prevalence of diabetes was 19.7%. Of these, 50.4% had no previous diagnosis, and it showed an incidence higher in the elderly people.[17]

It has also been found the CAD as present in family members with a history of heart diseases, and it is responsible for cardiovascular events in a population. The most prevalent diagnosis was CAD affecting 26 patients (25.24%). In Brazil, CAD is a class of cardiovascular diseases (CVD) with high hospitalization rate and cost. It is also the disease that remains one of the major causes of mortality in developing countries, reaching epidemic incidence and prevalence in several places worldwide, along with other risk factors that may lead to the need for surgical treatment.[18]

It was found in this study that myocardial revascularization (MRI) was the most performed surgery. In Brazil, the elderly population has grown considerably, and with this growth, the increase of CVD. In some cases, the therapeutic treatment is the most successfully procedure and provides excellent results for the patient. However, in others, the surgical treatment is highly indicated, and myocardial revascularization is the best option. This is due to the benefits it brings to the patient, among them, relief of thoracic pain, protection of an ischemic myocardium, improvement of ventricular function, prevention of new AMI, and the physical, psychic, and social recovery of the patient, improving his/her quality of life. Thus, myocardial revascularization is one of the most frequent surgeries performed, not only in Brazil, but worldwide.[19]

It is understood that cardiac surgeries are, in general, complex and require greater care in both the preoperative and postoperative periods. Despite the technological advances, these surgeries, like all others, are not free of serious medical complications. In the present study, pulmonary complication was the most frequent complication, up to 15 events (78.94%). Corroborating this study, a research carried out in 2014, presented the pulmonary complication as the most prevalent, with 35%.[20]

It has been thoroughly described, in 1983, the pulmonary dysfunction after cardiac surgery, showing in its experiments that the clinical manifestations were generally present up to the sixtieth postoperative day.[21] This study demonstrated that 94 (91.26%) of the patients were discharged to their respective rooms, and nine (8.73%) patients died as a result of pulmonary complications related at the time they were restricted in bed, to the use of several devices, such as drains, orotracheal tube, and catheters, making it difficult for the patient to leave the bed.

It was carried out in 2013 a study at a reference hospital in the North of Ceará State in which was found results similar to the ones in this study. Of 170 patients, 157 (90%) were referred to their hospital rooms. Eventually, they were discharged after a few days, and only 13 (10%) died.[14]

It has been shown that the longer hospital length of stay was ONE to THREE days (55.33%), as well as another study that found an average of hospital length of stay in the cardiac ICU of 2.33 days, with the patient without complications in his/her postoperative period. Among those who remained between SEVEN to NINE days or more, NINE patients died. In general, the patients have had some type of complication as a result of their history of illness or not. Some studies show intubation time as an important factor of pulmonary complications (pulmonary insufficiency, atelectasis) that can lead the patient to death.[22]

It has been described that pulmonary complications appeared first, in general, as a consequence of the longer hospital length of stay, in which the patient remains confined to the bed, impairing their mobility, leading to

several problems (atelectasis, pulmonary insufficiency). The delay in the withdrawal of devices (drains, catheters) also becomes a problem. It makes it difficult for the patient to move and leave the bed, thus increasing his/her hospital length of stay on the intensive care unit. Consequently, his/her clinical presentation picture worsens and, in some cases, leads to death. Therefore, when it is possible, it is important for the early removal of the devices, as well as carrying out of frequent respiratory physiotherapy, and encouragement of the patient to be seated outside the bed. The patients need to present a daily improvement to be discharged from the cardiology intensive care unit in the allotted time.

CONCLUSION

It has been identified that the main complications of patients undergoing cardiac surgery were pulmonary complications, followed by cardiac, infectious, neurological, and renal complications.

It is concluded that there was a significant association between postoperative complication and the type of patient discharge and postoperative complications versus hospital length of stay. Therefore, the greater the incidence of postoperative complication is, the more susceptible to death the patient is. Likewise, the longer the patient's hospitalization time is, the more exposed he/she will be to complications. Consequently, it is imperative that the multiprofessional team plan the discharge of the patient as early as possible, that is, as soon as he/she is admitted to the ICU to reduce the hospital length of stay in the cardiac ICU, as well as of potential complications.

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