

Postoperative of cardiac surgeries: prevalent complications within 72 hours*

Pós-operatório de cirurgias cardíacas: complicações prevalentes em 72 horas

Postoperatorio de cirugías cardíacas: complicaciones prevalentes dentro de las 72 horas

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Abstract: Objective: to identify complications in the initial 72 hours after cardiac surgery and their association with clinical and demographic characteristics. **Method:** this is a cross-sectional study, performed with the analysis of medical records of patients undergoing cardiac surgery between January 2018 and December 2019 in a large hospital. **Results:** of the 252 medical records evaluated, elderly men were prevalent, assisted by the Unified Health System, with comorbidities, and who used continuous medication. The prevalent type of surgery was single valve replacement and 75.8% of the patients had complications. The most frequent complication was of cardiac origin. Associations were observed between their presence and higher median age, comorbidities, and longer cardiopulmonary bypass, in addition to categorical complications with reintervention and 72-hour mortality and overall. **Conclusion:** cardiac, renal, electrolyte, pulmonary, hematological and neurological complications were identified, which in some cases are associated with more serious aspects.

Descriptors: Postoperative Complications; Cardiac Surgical Procedures; Prevalence; Critical Care; Nursing

Resumo: Objetivo: identificar complicações ocorridas nas 72 horas iniciais do pós-operatório de cirurgias cardíacas e sua associação com características clínicas e demográficas. **Método:** estudo transversal, realizado com a análise de prontuários dos pacientes submetidos a cirurgias cardíacas entre janeiro de 2018 a dezembro de 2019 em hospital de

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* Residency Completion Paper presented to the Multiprofessional Residency Program in Cardiology linked to the University of Passo Fundo/ Hospital de Clínicas de Passo Fundo/Prefeitura Municipal de Passo Fundo, 2020.



grande porte. **Resultados:** dos 252 prontuários avaliados, houve prevalência de homens, idosos, atendidos pelo Sistema Único de Saúde, com comorbidades e que utilizavam medicamentos contínuos. O tipo de cirurgia prevalente foi de trocas valvares unitárias e 75,8% dos pacientes apresentaram complicações, sendo as mais frequentes de origem cardíaca. Foram observadas associações entre a presença destas com mediana de idade maior, comorbidades e maior tempo de circulação extracorpórea, além de complicações categóricas com reintervenção e mortalidade em 72 horas e geral. **Conclusão:** foram identificadas complicações cardíacas, renais, hidroeletrólíticas, pulmonares, hematológicas e neurológicas, estando estas, em alguns casos, associadas a aspectos de maior gravidade.

Descritores: Complicações Pós-Operatórias; Procedimentos Cirúrgicos Cardíacos; Prevalência; Cuidados Críticos; Enfermagem

Resumen: **Objetivo:** identificar las complicaciones en las primeras 72 horas posteriores a la cirugía cardíaca y su asociación con las características clínicas y demográficas. **Método:** estudio transversal, realizado con el análisis de historias clínicas de pacientes sometidos a cirugía cardíaca entre enero de 2018 y diciembre de 2019 en un hospital de grande porte. **Resultados:** de las 252 historias clínicas evaluadas, hubo prevalencia de hombres mayores de edad, atendidos por el Sistema Único de Salud, con comorbilidades y que usaban medicación continua. El tipo de cirugía prevalente fue el reemplazo valvular único y el 75,8% de los pacientes presentó complicaciones, siendo las más frecuentes de origen cardíaco. Se observaron asociaciones entre su presencia y mayor mediana de edad, comorbilidades y circulación extracorpórea más prolongada, además de complicaciones categóricas con reintervención y mortalidad a las 72 horas y global. **Conclusión:** se identificaron complicaciones cardíacas, renales, electrolíticas, pulmonares, hematológicas y neurológicas, que en algunos casos se asocian a aspectos más graves.

Descriptor: Complicaciones Posoperatorias; Procedimientos Quirúrgicos Cardíacos; Prevalencia; Cuidados Críticos; Enfermería

Introduction

Although there is a gradual reduction in its incidence, in recent decades, cardiovascular diseases (CVD) are still the main cause of mortality in Brazil and the world, corresponding to approximately 30% of the total number of deaths registered in the country.¹ The development of this diseases is strictly related to factors such as sedentary lifestyle, smoking, harmful use of alcohol, and poor diet. Its occurrence determines an increase in morbidity and a high impact on the loss of productivity of affected individuals.¹⁻²

Currently, there are several possibilities for clinical treatments aimed at these conditions. However, when the therapeutic benefit of these resources is exhausted due to the worsening of pathologies that significantly compromise cardiac functioning, it becomes necessary to use invasive approaches, and for many individuals, cardiac surgery is the most recommended and effective treatment option.³

Cardiac surgeries are large-scale and highly complex procedures that generate intense organic repercussions, whether caused by the corrections carried out and/or by the methods that make them viable, such as the use of extracorporeal circulation (ECC). Furthermore, aspects such as age, gender, presence of comorbidities, type of surgery, and length of hospital stay contribute as factors that can influence the development of changes and a worse prognosis for the patient.⁴

Due to the state of instability, the postoperative period is considered a critical moment, as the human organism will be at the apex of coping and adapting to the intentional changes made during the surgical procedure, requiring monitoring and intensive care to control ineffective responses and promote systems balance.⁵

Despite the scientific and technological improvements observed in recent years, complications in this recovery phase are still frequent. National studies^{4,6-7} identified the predominance of pulmonary, cardiac, infectious, neurological, and renal complications in the populations analyzed, resulting in increased length of stay, thus, the risk associated with hospital infections, adverse events, and monetary costs and technological investments for its complete recovery.

In this context, the need for permanent care is necessary to ensure an adequate recovery. Efforts for clinical and hemodynamic monitoring in the postoperative period must be constant, as well as quick decision-making so that any changes that may occur are corrected as soon as possible.⁸

Nursing has a fundamental role in patient care during this period, acting in surveillance, recognition, and immediate intervention.⁵⁻⁶ Thus, identifying complications from cardiac surgeries that occur during this period and the aspects associated with them can provide subsidies to help professionals to act in advance, planning care and protocols aimed at an adequate recovery, associated with early discharge. Also, it favors the construction of indicators regarding the assessment of care, providing better management of health services.⁹

Based on the above, this study aimed to identify complications that occurred in the initial 72 hours of the postoperative period of cardiac surgery and their association with clinical and demographic characteristics.

Method

This is a cross-sectional, analytical study with a quantitative approach, carried out in a large hospital, located in the city of Passo Fundo, Rio Grande do Sul (RS), a reference for high regional cardiology complexity.

The research was carried out through the analysis of medical records of patients undergoing cardiac surgery at the institution, from January 2018 to December 2019, assisted in the Unified Health System (*Sistema Único de Saúde* - SUS), health insurance and privately, and referred to the general adult Intensive Care Unit (ICU) after the procedure. The hospital did not have a coronary ICU at the time this research was carried out. We excluded records of patients who died during the trans-operative period or who underwent procedures in which it was not possible to successfully correct the alteration of cardiac origin presented by the individual.

For patients who underwent more than one cardiac surgery, in the same hospitalization, the data referring to the first procedure were considered to avoid duplication of data. The subsequent data were considered only to compute the number of new interventions since the original procedure had been carried out within the period established for data collection and the correction was related to that.

The authors carried out data collection from May to August 2020 using a semi-structured instrument (physical form) previously designed for this purpose. Pertinent information was added based on the objective of the study and, subsequently, entered into a database in the Excel® program. The collected data regarding clinical history, surgical and postoperative information were extracted from medical and nursing evolutions. Also, numerical parameters were applied in the following postoperative situations: concerning bleeding, it was considered as a value change of drainage equal to or greater than 100 ml/h,¹⁰ and for the evaluation of electrolytes, the following

reference values of normality in force at the institution were considered to define the presence or absence of disturbances: potassium 3.6 to 5.2 mmol/L; calcium 1.00 to 1.20 mmol/L; sodium 135 to 145 mmol/L, magnesium 1.80 to 2.40 mg/dL and chlorine 97 to 107 mmol/L.

We grouped the types of surgeries found according to similarity to allow a more consistent analysis of the data. Thus, the groupings were: aortic corrections, correction of cardiac septal malformations, Coronary Artery Bypass Graft (CABG), CABG + Interventricular Communication (IVC) correction, CABG + valve replacements, CABG + valvuloplasties, CABG + correction of aorta dissection, double valve replacement, pericardiectomy, intracardiac tumor resection, metallic aortic valve replacement + metallic mitral valve replacement + Patent Foramen Ovale (PFO) correction, single valve replacements, biological aortic valve replacement + mitral valvuloplasty, straight aortic tube + aortic valvuloplasty, mitral valvuloplasty + correction of Atrial Septal Defect (ASD) and valvuloplasties.

To characterize the sample, we used descriptive statistics such as mean, median, and standard deviation of the numerical variable, and minimum and maximum values. The percentage was also used to analyze categorical variables in terms of frequency. Data normality was analyzed using the Kolmogorov Smirnov test. Numerical variables were compared using the Mann-Whitney test and categorical variables were analyzed using Chi-Square, both considering $p < 0.05$ for significant results. Statistical analyzes were performed using the BioEstat 5.0 program.

This study complied with the ethical precepts of Resolution 466/2012 of the National Health Council, which governs research involving human beings, and received approval from the Research Ethics Committee under CAAE 30700820.9.0000.5342, opinion 3.996.478, on April 29, 2020.

Results

We found a total of 259 records. Seven of them were excluded due to the impossibility of performing the proposed procedure or trans-operative death, constituting a final sample of 252 medical records analyzed.

Of these, 65.5% of the patients were male and 34.5% female, with a mean age of 63,18 years \pm 11,614. Regarding origin, 17.1% lived in the city of Passo Fundo, 18.1% in cities belonging to the 6th Regional Health Coordination, 62.7% in other regions of RS, and 1,6% were from the State of Santa Catarina. Regarding care, 86.1% of patients were assisted by the SUS and 13.9% through health insurance or privately, with 1.2% procedures performed on an urgent basis and the others (98.8%) from an elective form.

We found comorbidities and risk factors in 92.9% of the patients, with a mean of 2.6 ± 1.362 . Table 1 shows the main ones and other health antecedents. Only 6.3% of the patients had a positive family history of cardiovascular diseases.

As for continuous use medications, no information was found about it in 20.6% of the medical records, yet 67.8% of the patients were continuously using at least one medication, with an average of 3.9 ± 2.935 , and 396% used four or more medications.

Table 1 – Comorbidities/risk factors and health history more prevalent in the studied population. Passo Fundo, RS, 2020.

Comorbidities and risk factors	N	%
SAH [†]	178	70.6
Ex-smoker	63	25.0
Diabetes mellitus	55	21.8
Cardiac insufficiency	52	20.6
Dyslipidemia	47	18.7
Smoker	32	12.7
Obesity	31	12.3
Permanent atrial fibrillation or flutter	24	9.5
Hypothyroidism or hyperthyroidism	21	8.3
Depression	18	7.1
Health Background		
Previous AMI [‡]	30	11.9
Previous PTCA [‡]	13	5.2
Previous cardiac surgery	11	4.4
Previous CVA [§]	10	4.0
LVEF	Minimum: 18% Maximum: 85%	Mean: 58.4% \pm 12.523

[†]SAH: systemic arterial hypertension; [‡]AMI: acute myocardial infarction; [‡]PTCA: percutaneous transluminal coronary angioplasty; [§]CVA: cerebrovascular accident; ^{||}LVEF: Left ventricular ejection fraction.

We identified 29 different types of surgeries, which were grouped by the authors according to similarity to facilitate the analysis. The most performed groups were unitary valve replacements, CABG, and aortic corrections. The complete listing can be seen in Table 2. The mean ECC time was 96.2 minutes \pm 30.319 and the aortic clamping time was 64.0 minutes \pm 23.542. Of the 252 medical records studied, only 1.2% performed procedures without the use of ECC. Furthermore, 40.9% of patients received blood products during the trans-operative period.

Table 2 – Types of surgeries found in the survey. Passo Fundo, RS, 2020.

Type of Surgery	N	%
Single valve replacements	119	47.2
Biological aortic valve replacement	55	21.8
Metallic aortic valve replacement	33	13.1
Metallic mitral valve replacement	20	7.9
Biological mitral valve replacement	11	4.4
CABG*	67	26.6
Aortic corrections	15	6.0
Correction of aorta dissection	3	1.2
Correction of aneurysm with straight tube	2	0.8
Correction with valve tube	10	4.0
CABG* + valve replacements	14	5.6
CABG* + Biological aortic valve replacement	7	2.8
CABG* + Metallic aortic valve replacement	5	2.0
CABG* + Metallic mitral valve replacement	1	0.4
CABG* + Biological mitral valve replacement	1	0.4
Valvuloplasties	9	3.6
Aortic valve repair	4	1.6
Mitral valve repair	4	1.6
Tricuspid valve repair	1	0.4
Corrections of cardiac septal malformations	6	2.4
ASD correction [†]	5	2.0
IVC Correction [†]	1	0.4
Double valve replacement	5	2.0
Metallic aortic valve replacement + metallic mitral valve replacement	2	0.8
Biological aortic valve replacement + biological mitral valve replacement	3	1.2
Biological aortic valve replacement + mitral valvuloplasty	5	2.0
Intracardiac tumor resection	3	1.2
CABG* + Valvuloplasties	2	0.8
CABG* + Aortic valvuloplasty	1	0.4

CABG*+ Mitral valvuloplasty	1	0.4
Pericardiectomy	2	0.8
CABG* + IVC Correction[†]	1	0.4
CABG*+ Correction of aorta dissection	1	0.4
Mitral valvuloplasty + ASD Correction[‡]	1	0.4
Straight Aortic Tube + Aortic Valvuloplasty	1	0.4
Metallic aortic valve replacement + Metallic mitral valve replacement + PFO Correction[§]	1	0.4

*CABG: coronary artery bypass graft; †ASD: atrial septal defect; ‡IVC: interventricular communication; §PFO: patent foramen ovale.

Regarding the postoperative period, 75.8% of patients had complications within the initial 72 hours. Of these, 75.9% had one to three, 18.8% four to six, and 5.2% had seven or more, with ten being the maximum number of concomitant complications presented by a patient. Regarding the general ranking, the most common complications observed were low urinary output (38.9%), followed by arrhythmias (22.2%), hypertension (18.7%), hypotension (17.1%), and hypokalemia (15.1%). Table 3 shows the description of the complications found in order of prevalence.

Categorically, by systems, cardiac complications (46.0%) were more prevalent in this study, followed by renal (38.9%), electrolyte (25.8%), pulmonary (19.0%), hematological (10.7%), and neurological complications (7.9%).

Among cardiac complications, the most frequent were arrhythmias (22.2%), in addition to arterial hypertension (18.7%) and hypotension (17.1%). The most common arrhythmia found was atrial fibrillation (AF) (78.6%), followed by complete atrioventricular block (CAVB) (7.1%), ventricular fibrillation, and supraventricular tachycardia (3.6% each). Other types of arrhythmias that had one occurrence each (1.8% respectively) were ventricular tachycardia (VT), atrial flutter, an association of AF and CAVB, and association of AF, CAVB, and VT.

Among renal complications, low urinary output was the most prevalent (38.9%), followed by acute renal failure (4.0%) and need for hemodialysis (0.4%). Regarding electrolyte changes, hypokalemia (15.1%), hyperkalemia (6.0%), and hypocalcemia (4.4%) can be highlighted. The most

common pulmonary complications in the initial 72 hours of the postoperative period were mechanical ventilation (MV) above 48 hours (5.2%), pleural effusion (4.8%), and reintubation (4.4%).

Also, bleeding (10.3%) and deep vein thrombosis (DVT) (0.4%) were associated with the category of hematological complications. Regarding neurological complications, delirium was more prevalent (4.8%), followed by convulsive crises (2.4%) and ischemic Cerebrovascular Accident (CVA) (2.0%).

Table 3 – Complications found in the study in order of prevalence. Passo Fundo, RS, 2020.

Complications Category	N	%
Cardiac		
Arrhythmias	56	22.2
Hypertension	47	18.7
Hypotension	43	17.1
Use of an epicardial pacemaker	19	7.5
Low cardiac output	15	6.0
CRA*	13	5.2
Shock	9	3.6
Pericarditis	7	2.8
AMI†	6	2.4
Kidney		
Low urinary output	98	38.9
ARF‡	10	4.0
Hemodialysis	1	0.4
Electrolyte		
Hypokalemia	38	15.1
Hyperkalemia	15	6.0
Hypocalcemia	11	4.4
Hypernatremia	2	0.8
Hyponatremia	1	0.4
Pulmonary		
Time of MV§ >48h	13	5.2
Pleural effusion	12	4.8
Reintubation	11	4.4
Atelectasis	8	3.2
Hypoxemia	7	2.8
Bronchospasm	3	1.2
Accidental extubation	2	0.8
Pneumonia	2	0.8
Pneumothorax	2	0.8
Hematological		

Bleeding	26	1.3
DVT	1	0.4
Neurological		
<i>Delirium</i>	12	4.8
Convulsive crisis	6	2.4
CVA [†]	5	2.0

[†]CRA: cardiorespiratory arrest; [†]AMI: acute myocardial infarction; [†]ARF: acute renal failure; [§]VM: mechanical ventilation; ^{||}DVT: deep vein thrombosis; [†]CVA: cerebrovascular accident.

Of the 252 medical records studied, 4.8% required cardiac reintervention within 72 hours of the postoperative period, due to excessive bleeding (4.0%) and cardiac tamponade (0.8%). There were 4.4% of deaths in this period, and in the general outcome (comprising the entire hospitalization period), the mortality rate was 9.5%.

The analyzes performed showed that, statistically, patients who presented complications had a higher median age (66 ± 10.7 for patients with complications and 60 ± 14.9 for patients without complications, $p=0.001$), presence of comorbidities ($p= 0.047$), and longer ECC time (91 minutes ± 30.8 for patients with complications and 80.5 minutes ± 27.6 for patients without complications, $p=0.010$). The variables gender ($p=0.643$) and having received blood products during surgery ($p=0.455$) were not significant.

Regarding the variables of complications, according to the systems, significant associations of some of these with the variables of the type of surgery, reintervention within 72 hours, mortality within 72 hours, and overall mortality were observed, as shown in Table 4.

Table 4 – Proposed associations between variables. Passo Fundo, RS, 2020.

Variables	Reintervention in 72h	Mortality in 72h	Overall Mortality
Cardiac complications	0.007	0.013	0.205
Pulmonary complications	0.013	1.000	0.006
Neurological complications	0.245	0.605	0.006
Renal complications	0.224	0.347	0.125
Hematological complications	<0.001*	0.003	0.001
Electrolyte complications	0.195	0.734	0.806

The results presented refer to p-values. * Statistically significant result, but not relevant due to a small group of patients for the calculation.

Discussion

In this study, we observed that most of the population undergoing cardiac surgery at the institution within the study period was male, with a mean age of 63,18 years \pm 11.614, corroborating other studies found in the literature.^{3,5-6} Similar results were found in other studies,^{7,11} with a predominance of men (68.6% and 65.0%) and mean age of 60.6 and 65 years, respectively. The predominance of elderly people converges with population aging and increased life expectancy observed globally, also reflecting the evolution of disease management through clinical treatments and less invasive procedures, which prolong the arrival of patients to stages of greater risk and need for surgery.^{5,7}

However, aging also implies a decrease in the organic response to the physiological aggression involved in the procedure, making elderly people more susceptible to instabilities than younger patients.¹² This assertion reinforces the findings in this study, in which patients who developed complications within 72 hours postoperative initials had a higher median age than those who did not develop them.

There are few studies on this topic, which show a prevalence of females.¹³⁻¹⁴ We observed that women are associated with a late surgical indication, with a consequent increase in the hospital mortality.¹⁵ In addition, the persistent disparity between the genders can be related to the greater vulnerability of men to chronic diseases, considering that from a sociocultural point of view there are factors that influence behaviors of greater male resistance to health-related care, enhancing exposure to risk factors and hindering aspects of prevention and control of CVD.¹⁶⁻¹⁷

In this study, the presence of comorbidities and/or risk factors was significantly associated with the occurrence of complications in the postoperative period. This aspect was prevalent for 92.9% of patients, among which SAH, former smoking, diabetes mellitus, heart failure, and dyslipidemia stood out. Directly associated with this fact was that most patients used continuous medications, in which more than 1/3 were polymedicated, according to the classification of the World Health Organization.¹⁸

The presence of comorbidities and risk factors associated with the patient's history offer additional risk for the development of postoperative complications and a worse prognosis for the procedure.² We observed similar findings in a research carried out with 200 patients undergoing cardiac surgery in one hospital in the Southeast region of Brazil, in which 75.5% of patients were hypertensive, 30.0% diabetic, 13.6% smokers, and 12.2% had heart failure, with only a significant difference in the number of dyslipidemias, which constituted 57.0% of the sample.¹⁹

Another study⁶ with patients undergoing CABG and valve replacement surgery in RS also observed a large number of cases of hypertension (70.9%), in addition to a sedentary lifestyle (63.3%), stress (57.6%), former alcoholism (54.2), and former smoking (50.9%).

In this study, there was a prevalence of single valve replacement surgeries, followed by CABG and aortic corrections, unlike other studies found in the literature. In a retrospective study⁹ carried out in São José do Rio Preto, São Paulo, with 2.648 patients undergoing cardiac surgery, a prevalence of 62% of CABG was observed compared to 38% of valve replacement surgeries, similar to that observed in Minas Gerais,⁴ in which the most performed surgeries were CABG (53%), valve replacements (18%) and valvuloplasties (14%). One aspect in which this disagreement can be attributed lies in regional distinctions in the processes of illness, as well as in the access of individuals to the health system, also considering that there are different agreements between health regions for high complexity in the cardiology area.

ECC was used in most of the procedures observed in this work. Despite the evolution of minimally invasive procedures in large centers in recent years, ECC is still widely used in cardiac correction surgeries worldwide, having revolutionized the performance of these procedures by preserving cardiac functional characteristics, at the same time, that guarantees a safe surgical field for the team.²

There is no consensus on an ideal classification of time to keep the patient in this form of circulation. However, it is known that the shorter the time the patient is submitted to ECC, the lower the risk of injuries related to it, a fact corroborated by this study since a higher median ECC

was associated with the emergence of complications in the initial 72 hours after surgery, an aspect also observed in another study.²⁰

This occurs due to the body's induction of the systemic inflammatory response, caused by the passage of blood through the non-epithelialized surface of the extracorporeal circuits, causing changes in coagulation mechanisms, immune response, and increased venous tone, change in the hydro electrolytic state, myocardial dysfunction and pulmonary.^{2,17}

Complications within 72 hours of the postoperative period were observed in 75.8% of patients, a rate higher than that identified in other studies,^{4,2,6} in which complications reached around 58%, 52%, and 21% of the patients. There is variability in the order of prevalence of the categories of complications by the system in the aforementioned studies, which was also identified in this analysis.

Cardiac complications were more common, especially arrhythmias (mostly AF), hypertension, and hypotension. The occurrence of AF varies from 10 to 40% of patients undergoing CABG, reaching 50% in valve replacements and up to 60% in the association of the two procedures. The factors that trigger it are related to the inflammatory reaction of the pericardium and the excess of catecholamines, due to the imbalance of the autonomous system and, as a consequence of its development, there is a decrease in cardiac output and predisposition to the occurrence of thromboembolic events. In up to 90% of cases, this arrhythmia resolves within two months after the surgery performed.²¹

Furthermore, this category of complications was statistically associated with the need for reintervention within 72 hours of the postoperative period and mortality in the same period. Following this finding, researchers⁴ identified the low cardiac output syndrome as the complication that had the greatest impact on hospital mortality in a study carried out with 211 patients undergoing cardiac surgery, and its persistence for more than 24 hours was associated with high levels of mortality.

Low urinary output was a relevant complication, being the most prevalent in the study, although a small number of patients evolved from this alteration to Acute Renal Failure (ARF). This

complication is often observed in the postoperative period of cardiac surgery, and it may be associated with the use of ECC and its prolonged time.⁵ Its occurrence can precipitate hemodynamic and endocrine changes, being considered as a sensitive marker for the detection of renal lesions even when compared to serum creatinine levels, although ARF does not always have this parameter.²²

With the advance to stages of renal damage, the hospital stay of these patients is prolonged, consuming more technological and human resources invested in their recovery, as well as determining a worsening of the prognosis. It is important to monitor this parameter for the implementation of prevention and early treatment.²²

The changes in electrolytes were mainly related to the serum levels of potassium, calcium, and sodium, with a little divergence between the values found in this study and those described by other studies.^{2,4} The electrolyte imbalance in the body can cause complications for the patient if not reversed, especially at the cardiac level, highlighting the influence of sodium and potassium electrolytes, directly related to cardiac electrical conduction and muscle contraction, emphasizing the importance of their vigilance.²³

Pulmonary complications are also relatively common in this period, sporadically leading to critical disorders as long as the necessary preventive measures are established.¹⁴ Its development can be influenced by the period of immobility to which the patient is submitted, also associated with the late removal of devices that make it difficult for leaving the bed.⁹ In this study, we observed that changes of this nature were associated with the need for reintervention within 72 hours after surgery and overall mortality.

The criterion for considering MV time as a complication was above 48 hours, according to a study.⁴ However, variations of this parameter are observed in the literature, with research considering time longer than 24 hours^{9,14} and even longer than 12 hours as a complication.³ There are also reports of patients undergoing CABG without ECC, in which extubation was performed while in the operating room, an action later associated with a reduction in the length of stay in

the ICU.¹⁴ This practice, however, is not frequently observed in the studies area and is not routine at the institution where we carried out this study.

Bleeding was the main alteration identified in the group of hematological complications, which were significantly associated with mortality within 72 hours of the postoperative period and with overall mortality. The origin of this complication can be multifactorial and, mainly, related to the surgical procedure with the use of ECC.⁵ Prolonged contact with the extracorporeal circuit, high doses of heparin, hypothermia, and extensive surgical trauma contribute to the development of coagulopathies in the postoperative period.^{5,24}

According to authors,²⁴ this is a complication that can affect up to 20% of patients during this period, and approximately 5% of them will need new surgical intervention to correct this condition. Although the occurrence of bleeding was lower than expected, this study found similar values by identifying that 4.8% of patients required reintervention within the first 72 hours after surgery, mostly due to excessive bleeding.

Complications of neurological origin were less frequent, an aspect also observed in other studies^{2,5-7} and its manifestation was statistically associated with overall mortality. Delirium is a condition that usually occurs between the 2nd and 5th day after surgery and includes acute and fluctuating manifestations of delirium, disorientation, and language difficulties, with an overall incidence of approximately 3% of cases, reaching up to 20% in individuals over 60 years old.²⁵

Convulsive crises have a lower incidence, 0,5% to 3.5% of patients, and are related to conditions of hypoxemia, drug toxicity, and structural brain damage.⁵ According to literature data, CVA affects around 1.6% of patients, similar to this study, and its etiology is related to the presence of emboli, severe hypotension, and arterial fibrillation, being more observed in valve replacement surgeries than in CABG.²⁶

Deaths within 72 hours of the postoperative period represented 4.4% of the research population, with a mortality rate during the entire hospital stay of 9.5%. Considering the 72-hour interval, no data were found in the literature for comparison of results.

Regarding the immediate postoperative period (24 hours), a retrospective cohort study² described a 4.0% mortality rate in a population of 50 patients undergoing CABG. Another study⁷ observed that 8.7% of 103 patients undergoing cardiac surgery died within 10 days of surgery. With similar values, 30 days after the surgical procedure, a retrospective research⁹ identified a mortality rate of 9.1% of 2.648 patients undergoing cardiac surgery.

Considering the total hospitalization period, a study¹¹ carried out in Santa Catarina showed a 5.3% mortality rate for patients undergoing CABG. Other authors¹⁹ showed a rate identical to that identified in this research, in which 9.5% of the studied patients died, considering a total population of 200 patients. Despite the discrepancy of times presented, a similarity was observed between the mortality rate of this work and the others.

Based on the above, we understood that the findings observed can provide subsidies that favor the development of strategic actions to improve care, through preventive measures for the events described, as well as their identification and early intervention. It has the potential to contribute to the planning of services and protocols aimed at the area, as they are determined by concrete data that reflect reality.

The main limitation of this research was related to the origin of the data, since, when considering the information contained in medical and nursing evolutions, they are subject to the subjectivity of the professional in recording the information they consider pertinent.

Conclusion

The results found in this study pointed to a high prevalence of complications in the initial 72 hours of the postoperative period of cardiac surgery, and in some cases, they are even associated with more serious aspects, such as the need for surgical intervention and mortality. The most prevalent categories of complications were cardiac (in which arrhythmias, hypertension, and hypotension stood out), followed by renal, electrolyte, pulmonary,

hematological, and neurological complications. In terms of frequency, the complications identified here were similar to other studies in the literature.

Understanding these aspects allows the nursing team to foresee possible changes that may affect patients during this period, and their early identification is a determining factor to ensure an appropriate and satisfactory treatment. At a time of great instability as is the postoperative period of cardiac surgery, knowledge about the aspects that prevail in this scenario allows the professional to improve the care provided, planning and developing appropriate actions to ensure an adequate and brief recovery.

Furthermore, we suggest further studies in more detail, exploring the results found and other questions caused by them, for example, if there is a difference in the development of complications between the different types of surgeries and according to the duration of ECC. We also recommend future research studies with methodologies that have the potential to determine causality related to complications.

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Scientific Editor: Tania Solange Bosi de Souza Magnago

Associate Editor: Rosangela Marion da Silva

Promotion/Acknowledgment: To the Ministry of Health, University of Passo Fundo, Hospital de Clínicas de Passo Fundo, and Municipality of Passo Fundo for promoting multi-professional residences.

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How to cite this article

Covalski D, Pauli E, Echer AK, Nogueira RR, Fortes VLF. Postoperative of cardiac surgeries: prevalent complications within 72 hours. Rev. Enferm. UFSM. 2021 [Access on: Year Month Day]; vol.11 e75: 1-20. DOI: <https://doi.org/10.5902/2179769264147>