EVALUATION OF HOSPITAL PERMANENCE TIME IN HEART SURGERY IN A UNIVERSITY HOSPITAL

Avaliação do tempo de permanência hospitalar em cirurgia cardíaca em um hospital universitário

Evaluación del tiempo permanencia en el hospital en la cirugía del corazón en un hospital universitario

Morgana Maria Rampe Reis[1], Eliane de Fátima Almeida Lima[2], Karla Crozeta[3], Rita Inês Casagrande[4], Franciele Marabotti Costa Leite[5], Cândida Caniçali Primo[6]

ABSTRACT

Objectives: to verify the association between the length of hospital stay of patients undergoing cardiac surgery and the sociodemographic and clinical variables. **Method:** cross-sectional, retrospective study based on secondary data analysis of individuals who underwent cardiac surgery at a university hospital in the Southeast region of Brazil. **Results:** median length of hospital stay was identified higher in patients aged 60 years or older, male, with previous comorbidities. In addition, hospitalization was longer in individuals with postoperative complications such as neurological events, cardiac arrhythmias, acute renal failure, pulmonary complications, and nosocomial infection. **Conclusion:** the association of the characteristics and the identification of the profile of patients who usually stay longer in bed may be useful in the elaboration of protocols and institutional flows. **Descriptors:** Length of stay; Cardiovascular surgical procedures; Health care coordination and monitoring; Cardiovascular nursing.

RESUMO

Objetivos: verificar a associação entre o tempo de internação hospitalar de pacientes submetidos à cirurgia cardíaca com as variáveis sociodemográficas e clínicas. **Método:** estudo transversal, retrospectivo a partir da análise de dados secundários de indivíduos que

1 Nurse Master in Nursing from the Federal University of Espírito (UFES). Vitória (ES), Brazil.

2 Nurse. PhD in Nursing from the Federal University of Rio de Janeiro (UFRJ). Professor at the Federal University of Espírito Santo (UFES). Vitória (ES), Brazil.

3 Nurse, Doctorate in Nursing from the Federal University of Paraná (UFPR). Professor at the Federal University of Paraná, Curitiba (PR) - Brazil.

4 Nurse. PhD in Nursing from the Federal University of Rio de Janeiro (UFRJ). Professor at the Federal University of Espírito Santo (UFES). Vitória (ES), Brazil.

5 Nurse. PhD in Epidemiology from the Federal University of Pelotas (UFPel). Professor at the Federal University of Espírito Santo (UFES). Vitória (ES), Brazil.

6 Nurse. PhD in Nursing from the Federal University of Rio de Janeiro (UFRJ). Professor at the Federal University of Espírito Santo (UFES). Vitória (ES), Brazil.

realizaram cirurgias cardíacas em um hospital universitário, na região Sudeste do Brasil. **Resultados:** foi identificada mediana de tempo de internação hospitalar maior nos pacientes com idade de 60 anos ou mais, sexo masculino, com comorbidades prévias. Além disso, a internação foi mais prolongada nos indivíduos que apresentaram complicações no pós-operatório como eventos neurológicos, arritmias cardíacas, insuficiência renal aguda, complicações pulmonares e infecção hospitalar. **Conclusão:** a associação das características e a identificação do perfil de pacientes que em geral permanecem mais tempo no leito poderão ser úteis na elaboração de protocolos e fluxos institucionais.

Descritores: Tempo de internação; Procedimentos cirúrgicos cardiovasculares; Regulação e fiscalização em saúde; Enfermagem cardiovascular.

RESUMÉN

Objetivos: verificar la asociación entre la duración de la estancia hospitalaria de los pacientes sometidos a cirugía cardíaca y las variables sociodemográficas y clínicas. **Método:** estudio transversal retrospectivo basado en el análisis de datos secundarios de individuos que se sometieron a una cirugía cardíaca en un hospital universitario en la región sudeste de Brasil. **Resultados:** la mediana de la duración de la estancia hospitalaria se identificó más alta en pacientes de 60 años o más, hombres, con comorbilidades previas. Además, la hospitalización fue más prolongada en individuos con complicaciones postoperatorias como eventos neurológicos, arritmias cardíacas, insuficiencia renal aguda, complicaciones pulmonares e infección nosocomial. **Conclusión:** la asociación de las características y la identificación del perfil de los pacientes que suelen permanecer más tiempo en la cama puede ser útil en la elaboración de protocolos y flujos institucionales.

Descriptores: Tiempo de internación; Procedimientos quirúrgicos cardiovasculares; Regulación y fiscalización en salud; Enfermería cardiovascular.

INTRODUCTION

Hospital bed management aims to seek the use of available beds at their maximum capacity, safely within the established criteria, with the aim of optimizing the waiting time for hospitalization and satisfaction of internal and external clients of the hospital environment.[1]

Among the hospital indicators used in this management, the hospital stay stands out. The average hospital stay is defined as the average time in days that patients stay in the hospital and usually varies according to the patient's diagnosis and profile. This indicator is important for assessing service efficiency, underpinning health planning and management. In addition, the average length of stay reflects financially in hospital costs.[2]

Regarding hospital admissions, among the medical specialties, cardiac surgery involves many specificities and care, whether elective or urgent hospitalization. In addition, among noncommunicable diseases (NCDs), cardiovascular diseases (CVDs) are the leading causes of hospitalizations and generate the highest cost in this component of the national health system.[3]

To enable better monitoring of hospital indicators, especially the length of hospital stay, as well as promoting access to the actions and services needed to optimize beds and reorganize care, the Ministry of Health recommends standards and strategies that have been published in ordinances.[4] Among them, there is the Ordinance No. 1559, of August 1, 2008, which establishes the National Policy of SUS Regulation and organizes its actions in three dimensions, necessarily integrated with each other: Health Systems Regulation, Regulation Health Care and Regulation of Access to Care. Regulation of access to care aims to control, manage and prioritize access and care flows within the Unified Health System (SUS).[5]

It is also important to highlight the Ordinance No. 3390, of December 30, 2013, which establishes the National Policy of Hospital Care under the SUS, establishing the guidelines for the organization of the hospital component of the Health Care Network, having as one of its guidelines on regulated access and hospital bed management.[6]

This study is justified by the relevance of knowing the length of stay as an indicator for hospital bed management, especially for patients undergoing cardiac surgery.

In this sense, it is important to verify the association between length of hospital stay of patients undergoing cardiac surgery with sociodemographic and clinical variables.

METHOD

Retrospective cross-sectional epidemiological study from the analysis of secondary data of individuals who underwent cardiac surgery in a tertiary hospital in a city in the Southeast region of Brazil, which conducts teaching, research, care and state referral in cardiac surgery. .

Data were collected from medical records of patients undergoing cardiac surgery, from the cardiac surgery team's database and from the management application for university hospitals. The population consisted of patients undergoing cardiac surgery from August 1, 2015 to April 30, 2017, totaling 200 cases. The choice of this period was due to the availability by the cardiac surgery team of the list of patients who underwent all types of cardiac surgery during this period.

Inclusion criteria were cases of cardiac surgery with or without cardiopulmonary bypass in men and women over 18 years. Patients who exclusively performed procedures such as implantation of electronic devices were excluded.

Data collection took place from May to September 2017. For the collection, a form was developed to identify the profile of the patient who underwent cardiac surgery, according to sociodemographic and clinical data: total length of hospital stay, pre-time, intensive care time, postoperative time, age, gender, race/color, municipality, partner, occupation, place of hospitalization, regulated access, previous AMI, time occurrence of AMI, previous ICU stay, type of cardiac surgery, surgical status, surgery time, surgery withdrawal, previous cardiac surgery, ejection fraction, CPB time, cardiac approach, ICU readmission, death, associated comorbidities, smoking, trans and postoperative complications, as well as duration of mechanical ventilation. After collection, the data were coded and reviewed by the researcher and then entered into a spreadsheet in the Microsoft Office® Excel 2010 program.

The analysis was performed using the Stata 14.0 statistical program. Data normality was tested by the Shapiro-Wilk test and by graphical inspection of the histogram, where the outcomes presented asymmetric distribution. Thus, to compare numerical variables, Kruskal-Wallis tests were used for three or more independent groups, and Mann-Whitney tests for two independent groups. The significance level allowed was p ≤ 0.05.

The research was approved by the Ethics and Research Committee of the Health Sciences Center of the Federal University of Espírito Santo, on November 3, 2016, under opinion No. 1,803,817, and was conducted according to ethical standards.

RESULTS

There was a difference between the mean and median hospitalization, due to the asymmetry of the data, thus the median better represented the results. The median preoperative hospitalization time was 7 days, ICU stay and postoperative stay was 5 days and the total time was 19 days, while the average time was 23 days of total hospital stay , 8.1 preoperative time, 6.3 intensive care time and 9.5 postoperative time.

According to Table 1, when the preoperative hospitalization time was evaluated, it was observed that there was a relationship with age and gender. There is a higher median hospitalization in the group of older people (60 or older) and males (p <0.050).

Regarding the length of stay in the ICU, there was a relationship only with age, being longer among people 60 years or older. In the postoperative period, the median was higher in the black group. When evaluating the total hospitalization time, a significant relationship with the occupation variable was observed and those who reported not having an occupation perceived a higher median total hospitalization.

Table 1 - Median length of stay according to sociodemographic variables of patients undergoing cardiac surgery. University Hospital, Vitória, ES, 2017.

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-value	Median	p-value	Median	p-value	Median	p-value
Age								
Up to 59	6,0	0,026*	4,0	0,014*	6,0	0,569*	18,5	0,087*
60 or more	8,0		5,0		5,0		20,5	
Sex								
Male	8,5	0,024*	5,0	0,729*	5,0	0,471*	20,0	0,218*
Feminine	6,0		5,0		6,0		18,5	
Race / Color								
White	8,5	0,539**	5,0	0,306**	6,0	0,026**	20,0	0,090**
Black	11,0		4,0		15,0		32,0	
Parda	6,0		5,0		4,0		18,0	
County								
Grande Vitória	8,0	0,085**	5,0	0,362**	5,0	0,063**	19,0	0,046**
Interior	6,0		5,0		7,5		20,0	
Others	4,5		4,0		4,0		13,0	
Has companion								
Yes	7,0	0,695*	5,0	0,475*	5,0	0,476*	19,0	0,602*
No	7,0		5,0		6,0		20,0	
Occupation								
Yes	6,0	0,323*	4,0	0,190*	4,0	0,137*	17,5	0,039*
No	7,5		5,0		5,0		21,0	

*Teste Mann-Whitney; ** Teste Kruskal-Wallis. ICU - Intensive Care Unit.

Table 2 presents the median length of stay according to the clinical variables of patients undergoing cardiac surgery.

When the preoperative hospitalization time was evaluated, it was noted that there was a relationship with hypertension, diabetes mellitus, chronic renal failure, dyslipidemia, angina, previous AMI, AMI time and smoking. In this study, smokers were those who were currently smoking, regardless of the amount.

The highest median hospitalization in the presence of these comorbidities and the time of AMI up to 90 days stands out, as well as the highest median hospitalization in the group of smokers (p <0.050). On the other hand, there was also a relationship with rheumatic fever and valvular heart disease in the preoperative time, but there was a lower median hospitalization in the presence of these two comorbidities (p <0.050).

When the length of stay in the ICU was assessed, a higher median length of stay was observed in the presence of chronic kidney disease. There was a relationship between the length of postoperative hospitalization and chronic renal failure, rheumatic fever, valvular heart disease and heart failure. In the presence of these comorbidities, a higher median length of stay is observed. There was also a relationship with dyslipidemia, angina and previous history of AMI, but with a lower median hospitalization in these cases (p <0.050).

Regarding the total hospitalization time, a relationship with chronic kidney disease, heart failure and AMI up to 90 days was identified. In these cases, the median total hospitalization was higher (p <0.050).

Table 2 - Median length of stay according to clinical variables of patients undergoing cardiac surgery. University Hospital, Vitória, ES, 2017.

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-valor	Median	p-value	Median	p-value	Median	p-value
Arterial hypertension								
Yes	9,0	0,000*	5,0	0,771*	5,0	0,302*	20,0	0,175*
No	5,0		4,0		6,0		18,0	
Diabetes Mellitus								
Yes	9,0	0,009*	5,0	0,962*	4,0	0,143	18,0	0,542*
No	6,0		5,0		6,0		19,5	
IRC								
Yes	13,5	0,000*	7,0	0,032*	14,5	0,013	29,0	0,000*
No	6,0		5,0		5,0		19,0	
Dyslipidemia								
Yes	9,0	0,027*	5,0	0,299*	4,0	0,023*	19,5	0,795*
No	6,0		4,0		6,5		19,0	
Lung Diseases								
Yes	11,0	0,056*	6,0	0,906*	8,0	0,218*	26,0	0,129*
No	6,0		5,0		5,0		19,0	
Rheumatic fever								
Yes	3,0	0,002*	4,0	0,800*	11,0	0,000*	25,0	0,480*
No	8,0		5,0		4,0		19,0	
Valvular heart disease								
Yes	4,0	0,000*	5,0	0,377*	8,0	0,000*	20,0	0,695*
No	9,0		5,0		4,0		19,0	
Angina								
Yes	10,0	0,002*	5,0	0,839*	4,0	0,020*	19,0	0,630*
No	6,0		5,0		6,0		19,0	

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-valor	Median	p-value	Median	p-value	Median	p-value
Cardiac insufficiency								
Yes	9,0	0,793*	5,0	0,177*	9,0	0,001*	25,0	0,032*
No	7,0		5,0		5,0		19,0	
Previous AMI								
Yes	11,0	0,000*	5,0	0,732*	4,0	0,006*	20,0	0,352*
No	5,5		5,0		6,0		19,0	
AMI time (days)								
Up to 90	12,0	0,001*	5,0	0,697*	4,0	0,769*	23,0	0,005*
90+	6,5		5,0		4,0		16,5	
Smoker								
Yes	10,0	0,049*	5,5	0,444*	6,5	0,611*	22,0	0,192*
No	6,0		5,0		5,0		19,0	

*Teste Mann-Whitney; ** Teste Kruskal-Wallis. CKD - Chronic Kidney Failure. AMI - Acute Myocardial Infarction. ICU - Intensive Care Unit.

Table 3 presents the median length of stay according to the variables related to the patients' stay. It was observed that there was a relationship with the place of hospitalization, previous ICU stay, surgical suspension and number of times it was suspended. The admission of the patient to the emergency room, hospitalization before ICU surgery, surgery suspended and the fact that she was suspended more often led to the highest median hospitalization.

Regarding the length of stay in the ICU, among those patients who had surgery suspended, those whose suspension occurred only once, as well as those who remained on mechanical ventilation for 6 hours or less, had a lower median stay. However, those who needed to be readmitted to the ICU had a higher median stay.

Regarding the length of postoperative hospitalization, patients requiring ICU readmissions reached a higher median. Regarding the total length of stay, those admitted to the ICU, who remained in the ICU before surgery, had their surgeries suspended, the suspension occurred more often and were readmitted in the ICU had higher median hospitalization.

Table 3 - Median length of stay according to variables related to hospitalization of patients undergoing cardiac surgery. University Hospital, Vitória, ES, 2017.

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-value	Median	p-value	Median	p-value	Median	p-value
Place of hospitalization								
Emergency Room	11,0	0,000**	5,0	0,302**	4,0	0,731**	23,0	0,000**
Nursery	5,0		5,0		5,0		16,0	
ICU	2,5		9,5		11,5		26,5	
Regulated Access								
Yes	11,0	0,148*	5,0	0,448*	4,0	0,196*	22,0	0,309*
No	7,0		5,0		5,0		19,0	
Prior ICU admission *								
Yes	11,0	0,012*	7,0	0,071*	7,0	0,522*	24,0	0,014*
No	6,0		5,0		5,0		18,5	
Suspended surgery								
Yes	10,0	0,000*	5,0	0,774*	6,0	0,352*	23,0	0,000*
No	4,0		5,0		4,0		16,0	

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-value	Median	p-value	Median	p-value	Median	p-value
Number of Times **								
1	7,0	0,000**	4,0	0,013**	6,0	0,517**	20,0	0,011**
2 to 3	11		6,0		5,5		24,5	
> = 4	14,0		6,0		5,0		25,0	
Postoperative mechanical ventilation time (hours)								
≤ 06	6,0	0,747**	4,0	0,006**	4,0	0,423**	17,5	0,063**
06-12	7,0		5,0		6,0		20,0	
≥ 12	8,0		5,0		5,0		22,5	
Not applicable	8,5		--		12,0		11,0	
ICU readmission								
Yes	11,0	0,110**	7,0	0,025**	28,0	0,000**	52,0	0,000**
No	7,0		4,0		5,0		19,0	
Not applicable	6,0		16,5		12,0		16,0	

*Teste Mann-Whitney; ** Teste Kruskal-Wallis. ICU - Intensive Care Unit.

According to Table 4, the median length of hospital stay of patients undergoing myocardial revascularization surgery was higher, but lower in postoperative time. Regarding the length of preoperative hospitalization, patients with bioprosthesis and mitral localization who did not undergo previous cardiac surgery had a higher median hospitalization. Regarding the time of postoperative hospitalization, those with biological prosthesis and aortic location, who used CPB, CPB time up to 57 minutes and who were not surgically reopened had a lower median hospitalization.

As for the total hospitalization time, patients with CPB time less than 57 minutes and who were not reopened by the cardiac surgery team had a lower median hospitalization.

Table 4 - Median length of stay according to the variables related to the procedures of patients undergoing cardiac surgery. University Hospital, Vitória, ES, 2017.

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-value	Median	p-value	Median	p-value	Median	p-value
Cardiac surgery								
CRM	9,0	0,000**	5,0	0,389**	4,0	0,000**	19,0	0,257**
Valve exchange	4,0		5,0		9,0		20,0	
CRM / valve exchange	5,0		4,0		6,0		14,0	
Valvuloplasty	4,0		3,0		29,0		36,0	
CIA / CV Correction	2,0		3,0		4,0		9,0	
Other	6,0		5,5		12,0		22,0	
Prosthesis Type								
Biological	4,0	0,000**	6,0	0,059**	6,5	0,000**	23,0	0,563**
Metallic	3,0		4,0		11,5		20,0	
Not applicable	9,0		5,0		4,0		19,0	
Prosthesis location								
Mitral	4,5	0,000**	5,0	0,662**	9,0	0,000**	20,5	0,668**
Aortic	4,0		4,0		8,0		18,0	
Mitroaortic	3,0		5,0		14,0		24,0	
Not applicable	9,0		5,0		4,0		19,0	

Variables	Preoperative length of stay (days)		ICU length of stay (days)		Postoperative length of stay (days)		Total length of stay (days)	
	Median	p-value	Median	p-value	Median	p-value	Median	p-value
Surgical status								
Elective	7,0	0,968*	5,0	0,875*	5,0	0,060*	19,0	0,606*
Urgency / Emergency	8,0		5,5		18,5		26,0	
Previous heart surgery								
Yes	3,0	0,010*	6,0	0,107*	9,5	0,080*	22,5	0,372*
No	7,0		5,0		5,0		19,0	
Ejection fraction (%) **								
Up to 63	8,5	0,523*	5,0	0,609*	5,0	0,456*	21,0	0,539*
Over 63	7,0		5,0		5,0		19,5	
Surgery time (minutes)								
Up to 270	6,0	0,206*	4,0	0,064*	6,0	0,380*	18,5	0,514*
More than 270	8,5		5,0		4,0		20,0	
Cardiopulmonary bypass								
Yes	7,0	0,392*	5,0	0,353*	5,0	0,047*	19,0	0,900*
No	9,0		3,0		12,0		22,0	
CPB time (minutes)								
Up to 57	6,0	0,288*	4,0	0,101*	4,0	0,007*	18,0	0,032*
Over 57	8,0		5,0		6,0		21,5	
Reopened by heart surgery								
Yes	5,0	0,274*	6,0	0,266*	27,0	0,001*	36,0	0,050*
No	7,0		5,0		5,0		19,0	
Reason for re-approach								
Valve exchange	--	0,595**	36,0	0,243**	27,0	0,243**	63,0	0,230**
Bleeding	06		6,0		3,0		10,5	
Mediastinitis	11,0		6,0		68,0		85,0	
Pericardial effusion or tamponade	5,0		6,5		33,0		36,0	
Cardiac arrhythmia	6,0		4,0		19,0		29,0	

*Teste Mann-Whitney; ** Teste Kruskal-Wallis. ICU - Intensive Care Unit. CABG - Myocardial Revascularization Surgery. CIA - Interatrial Communication. CIV- Interventricular Communication.

DISCUSSION

The shorter the hospital stay of patients undergoing cardiac surgery, the better the prognosis, as the early return to daily activities, as well as family life, accelerates their rehabilitation. The use of protocols to reduce the length of hospital stay in patients after cardiac surgery has been increasingly adopted, reflecting in hospital costs reduction, but maintaining the quality of care.[7]

More and more elderly people require some form of cardiovascular intervention such as cardiac surgery.[8] EuroSCORE determines that there is an increased risk of death above 60 years of age, with an additional point every 5 years after this age.[9] not having an occupation present higher median total hospitalization. It is important to emphasize that the active patients who perform a work activity are usually the youngest and those with the greatest capacity for postoperative recovery. Elderly patients are carriers of multiple chronic degenerative pathologies and are the ones most in need of surgery. In the elderly, postoperative complications of cardiac surgery are associated with high morbidity and mortality, due to the high prevalence of comorbidities and lower functional reserve, thus consuming more health services because they require prolonged care, and the bed occupancy time is longer than other age groups.[10]

Men had longer preoperative time, which may be due to the need for clinical compensation before cardiac surgery.

In Brazil, women are aware of their health problems and seek health services more than men.[11] In addition, men often do not have the necessary therapeutic follow-up, being more susceptible to cardiovascular events.[12]

A study conducted in Recife evaluated the use of EuroSCORE as a predictor of postoperative morbidity after cardiac surgery, with good accuracy for respiratory infection and dialysis renal failure. Unfortunately, in the present study, this score was not found in all medical records analyzed and the information recorded was not sufficient to calculate it. In this sense, there is the importance of using care tools such as this type of score, in order to support the conduct and predict the risk of death due to cardiac surgery.[13]

In relation to previous clinical comorbidities, patients with renal insufficiency are more predisposed to postoperative complications, prolonged hospitalization time, higher costs during hospitalization and higher mortality than those without renal dysfunction. Smoking patients had a higher median preoperative time. Smoking history is known to be associated with prolonged hospitalizations. Smoking cessation reduces surgical and clinical complications, and patients undergoing preoperative evaluation should be encouraged to cease it regardless of the time interval until surgery.[14]

Patients who had CPB time up to 57 minutes had a median postoperative time and shorter total hospitalization time. The deleterious effects of CPB are widely known, since it causes a systemic inflammatory response, with the release of substances that impair coagulation and the autoimmune system. It is also known that the longer the CPB time, the greater the physiological imbalance, prolonging recovery and increasing the length of hospital stay.[15]

It is noteworthy that the cases in which it was necessary to re-approach by the cardiac surgery team presented both higher median postoperative time and total hospitalization time. Mediastinitis, for example, is a type of infectious complication that often requires surgical reintervention, in which case treatment leads to increased hospitalization time, increased costs and higher morbidity and mortality rates.[16]

It is noted that pulmonary complications, acute renal failure and nosocomial infection guaranteed a higher median ICU time, postoperative period and total hospitalization. In general, the presence of complications resulting from cardiac surgeries may increase the length of hospital stay. Complications that increase ICU length of stay are mainly those related to respiratory function, such as COPD and smoking, pulmonary congestion, prolonged mechanical ventilation time, infections, renal failure, stroke and hemodynamic instability, such as arterial hypertension, arrhythmias and AMI.[15]

Measures to reduce these postoperative complications and length of stay of these patients should be encouraged at the institution, since cardiac surgical interventions are part of the current therapy of heart disease, are a significant source of demand for economic and technical resources, and are demands for greater economic impact on hospitalizations authorized by SUS.[7]

CONCLUSION

It was possible to identify a higher median length of hospital stay related to the sociodemographic and clinical characteristics of patients undergoing cardiac surgery, including: age 60 years or older, male gender, with previous comorbidities, especially CKD, as well as smoking, having previously been admitted to the ICU and surgical suspension. In addition, hospitalization was longer in individuals with postoperative complications such as neurological events, cardiac arrhythmias, ARF, pulmonary complications, and nosocomial infection.

The association of these characteristics may be useful in the elaboration of protocols and institutional flows, since the profile of patients who can stay longer in bed was identified.

The results of this research suggest that strategies should be encouraged to reduce hospital stay of patients undergoing cardiac surgery in the institution. Actions may be developed at the outpatient (in the case of elective surgery) and hospital level, preparing the patient adequately for cardiac surgery, in order to minimize surgical risks, and also prevent postoperative complications. In addition, after hospital admission, prioritize cardiac intervention, ICU and hospital discharges based on institutional protocols that take into account patients' sociodemographic and clinical characteristics.

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Corresponding author
Eliane de Fátima Almeida Lima
Address: Av.Marechal Campos, 1468, Bairro Bonfim
Vitória/ES, Brazil
Zip code: 29.047-105
E-mail address: elianelima66i@gmail.com
Telephone number: +55 (27) 3335-7281