

# Pain intensity and postoperative functional assessment after heart surgery

*Avaliação da intensidade de dor e da funcionalidade no pós-operatório recente de cirurgia cardíaca*

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## *Abstract*

**Objective:** To evaluate, in patients submitted to heart surgery, the intensity of pain and the level of functionality during the preoperative period, on the 7<sup>th</sup> postoperative day and at hospital discharge. A secondary objective was to evaluate any possible relationship between pain and functionality taking into account the following variables: gender, age, first heart surgery or re-interventions, use of cardiopulmonary bypass (CPB), type of surgery and physiotherapeutic follow-up.

**Method:** Forty-one patients who had undergone elective heart surgery at the Teaching Hospital of Botucatu/UNESP were studied. Pain intensity was measured using the VAS scale and functionality by the FIM scale (Functional

Independence Measure) in the physical domain.

**Results:** It was observed that the intensity of pain was higher on the 7<sup>th</sup> postoperative day when compared with the preoperative period and at hospital discharge. No pain rating score was shown in the preoperative period, while a median pain intensity of 3 (moderate pain), was noted at hospital discharge. The highest levels of functional loss occurred on the 7<sup>th</sup> postoperative day compared to the total scores obtained in the preoperative period and at hospital discharge. A significant correlation between pain and functionality was observed; a decrease in level of pain between the 7<sup>th</sup> postoperative day and hospital discharge contributed to an increase in the functional levels.

**Conclusion:** The evaluations performed in the

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preoperative period provided predictable results. The evaluations carried out on both the 7<sup>th</sup> postoperative day and at hospital discharge enabled a classification of patients according to their functional gain or loss, which contributed to identify those who require more care and training of their abilities.

**Descriptors:** Cardiac surgical procedures. Pain. Pain, postoperative. Pain measurement. Rehabilitation.

#### Resumo

**Objetivo:** Avaliar a intensidade de dor e o nível de funcionalidade em pacientes submetidos à cirurgia cardíaca nos períodos pré-operatório, 7<sup>o</sup> pós-operatório e alta hospitalar, relacionando-os entre si. **Relacionar funcionalidade com:** sexo, faixa etária, primeira cirurgia cardíaca ou reoperação, uso de circulação extracorpórea (CEC), tipo de cirurgia e acompanhamento fisioterapêutico.

**Método:** Foram estudados 41 pacientes que realizaram cirurgia cardíaca eletiva por toracotomia médio-esternal (TME) no HC da Faculdade de Medicina de Botucatu/UNESP. A intensidade de dor foi avaliada pela escala de VAS e a

funcionalidade, pela escala MIF (medida de independência funcional) no domínio físico.

**Resultados:** A intensidade de dor mais elevada foi no 7<sup>o</sup> pós-operatório comparado com os momentos pré-operatório e alta. No pré-operatório, não houve índice de dor; na alta, a intensidade mediana foi 3 (dor moderada). Os níveis mais elevados de perda funcional ocorreram no 7<sup>o</sup> pós-operatório, quando comparados com os escores totais do pré-operatório e da alta. Verificou-se correlação significativa entre dor e funcionalidade, demonstrando que o decréscimo do nível de dor entre o 7<sup>o</sup> pós-operatório e a alta contribuiu para a elevação dos níveis funcionais.

**Conclusão:** As avaliações realizadas no pré-operatório proporcionaram resultados preditivos a serem alcançados. As avaliações realizadas no 7<sup>o</sup> pós-operatório e na alta possibilitaram a classificação dos pacientes de acordo com perdas e ganhos, indicando aqueles que necessitavam de maior cuidado e treinamento em suas capacidades.

**Descritores:** Procedimentos cirúrgicos cardíacos. Dor. Dor pós-operatória. Medição da dor. Reabilitação.

## INTRODUCTION

Technological advances have provided improvements in the results of treating cardiovascular diseases. However, there is a necessity to know the effectiveness of these interventions. Among the aspects to be considered, pain and functionality of the patient in performing day to day activities have been highlighted [1, 2].

In heart surgery, postoperative pain is considered an important result to assess the physical and psychological damage in patients. Due to the subjective nature, the use of questionnaires and score systems are necessary to estimate a precise measurement [3-5].

In the assessment of pain, scales organized in categories are utilized: numerical scales of verbal descriptions, non-numerical graphical representations and visual analogies (VAS) [6]. In heart surgery the VAS scale is the most utilized [2,3,7]. Walther et al. [2] evaluated pain and stressed that postoperative pain and the quality of life are important results necessary in order to know and to assess the physical and physiological harm to patients and to achieve a better recovery.

The quality of life related to day-to-day activities has made quantifying changes in capacity linked to human functions using scales that measure functional independence of very much interest. This assessment, apart from being objective in the treatment plan, provides a better understanding of the difficulties of individuals [8, 9]. Among

the most commonly used scales are: Bartel's index and the Functional Independence Measure (FIM) [10].

FIM was validated in Portuguese by researchers from the Rehabilitation Medicine Service in HC-FMUSP [11]. The FIM scale is organized by classifying the patient's ability to perform activities independently versus his need for assistance from another person or an adaptation resource. If help is necessary, the scale quantifies this need [10, 12,13].

Many studies were carried out using the FIM scale [8,14-16], but in heart surgery few have been performed among which, one by Sansone et al. [17] assessed patients involved in heart surgery rehabilitation programs and demonstrated the validity of the instrument.

In heart surgery, recovery is tied to rehabilitation. Physiotherapy has its efficacy reported in publications, mainly in its approach to respiratory problems, an important problem in the postoperative period [18, 19]. But, there has still been very little discussion related to possible changes of functionality in these patients [20].

Due to the knowledge of possible postoperative complications, there is a necessity to measure functionality in the pre- and post-operative periods in order to understand the dynamics of the therapeutic process and to interfere when necessary, not allowing a functional limitation to occur. Motor functional capacity is one relevant aspect during recovery after heart surgery, because changes in the physical well-being of the patient cause changes in other areas of his life [19, 20].

The quality of life is directly linked to recovery after heart surgery, in particular in the physical dimension. According to the studies of Nielsen et al. and Myles et al. [21], the indicator of a low quality of life after heart surgery is an incomplete recovery of the functional state whilst in hospital.

The present study is justified as there are few scientific data that assess pain intensity and functionality; it tries to illustrate the current consensus in highlighting the clinical relevance of the information obtained by instruments capable of adequately assessing the impact and the quality of interventions in heart surgery.

The goal of this study consisted in assessing pain intensity and the functional level of patients submitted to heart surgery in the preoperative period, on the 7<sup>th</sup> postoperative day and at hospital discharge and comparing these three periods.

The relationship between functionality and gender, age, first heart surgery or reoperation, use of cardiopulmonary bypass (CPB), type of surgery and physiotherapeutic follow-up was assessed.

## METHOD

This research is characterized by being a study of experimental groups composed of individuals submitted to elective heart surgery on the cardio-thoracic ward in the Hospital das Clinicas of the Medical School of Botucatu (FMB/UNESP). The consecutive patients were studied, according to inclusion and exclusion criteria, in the period from June 2002 to March 2003. The study was submitted to and approved by the Ethics Research Committee of the Institution (HC-FMB/UNESP).

### Patients

Forty-one heart disease patients, 31 with coronary diseases and 10 with valve diseases, submitted to elective heart surgery and who agreed to participate by signing consent forms were included in the study. These patients were submitted to on-pump and off-pump procedures. Their ages ranged from 20 to 84 years with a predominance in the 50- to 69-year age range; 16 (39.0%) patients were women and 25 (61.0%) were men. Patients submitted to emergency surgery, incapable of completing the questionnaire and those that evolved with the necessity of intra-aortic balloons, mechanical ventilation of more than 24 hours and death were excluded.

### Procedure

The patients were submitted to assessment on three occasions: preoperative period (PO), 7<sup>th</sup> postoperative day (7<sup>th</sup> PO) and at hospital discharge (HD). The 7<sup>th</sup> Postoperative day and hospital discharge was also established as criteria

of data collection to study a peculiar characteristic of this sample. It was observed in a pilot study that, although patients received hospital discharge on the 7<sup>th</sup> postoperative day, some remained in the hospital due to transportation problems, so, hospital discharge occurred after the 7<sup>th</sup> PO.

At each stage, the application of specific scales was made to assess pain and functionality. The patients were classified according to the type of surgery, use or not of CPB, whether it was the first heart surgery or reoperation and physiotherapeutic follow-up.

To classify patients in the physiotherapeutic follow-up there was no interference in the normal hospital routine; only procedures performed by physiotherapists were considered. In the study period, the patients were classified as routine (considered five months with physiotherapy follow-up performed by the Physiotherapy Service of the Hospital das Clinicas – FMB, when requested by the doctor) and non-routine (considered four months, with physiotherapeutic follow-up performed by trainee physiotherapists from the heart surgery service, without any specific request from the doctor as the physiotherapist was present during all the day).

### Primary evaluation variables: pain and functionality

Pain intensity was evaluated using the VAS scale [5-7]. In the evaluation, the patient observed the front of a ruler and with a pencil marked an indication of his pain; afterwards, the researcher recorded the point marked in centimeters shown on the back of the ruler, thereby identifying a numerical value for the intensity of pain felt by the patient.

To analyze the level of pain on the VAS scale, the classification of intensity according to Borg [23] was adopted: 0.5 – 1.9 = very weak; 2.0 - 2.9 = weak; 3.0 – 4.9 = moderate; 5.0 – 6.9 = strong; 7.0 – 9.9 = very strong and  $\geq 10$  extremely strong.

Functionality was assessed using FIM, a scale that aims to measure what the individual really does, independent of the diagnosis, producing effective scores of incapacity and not of deficiency [11,12,14].

An adaptation of the FIM scale was utilized, considering the performance of abilities in day-to-day activities related to the motor functional capacity (Annex 1), according to Myles et al. [22] who suggested and applied changes to the scale depending on the group of patients. Oden et al. [15] believed that the motor dimension was more appropriate to assess the day-to-day activities.

Organization of the adapted scale was achieved during the application of the pilot project, after discussions with qualified professionals from healthcare services and physiotherapists, verifying measurement properties of the instrument in respect to the proposed objectives and necessities observed in the profile of patients, following the methodological guidance suggested by Ferraz [20] and Pimenta [5].

Annex 1. adapted scale of Functional Independence Measure (FIM)

CATEGORIES	PREOPERATIVE	7th PO	DISCHARGE
PERSONAL CARE			
Feeding			
Self-care			
bathing			
Clothing upper trunk			
Clothing lower trunk			
Internal hygiene			
MOBILITY/TRANSFERENCE			
bed / chair /Wheel chair			
bathroom			
Shower bath/ bath-tub			
Movement			
Walking / Wheel chair			
stairs			
TOTAL			

The adapted FIM scale was organized in three categories: Personal Care, Mobility/Transferences and Movement. The functional activities of each item were marked in relation to the degree of dependence using scores between 1 and 7, establishing a possible total range of between 11 and 77. This points system is stipulated by the scale through an equivalence in functionality according to the Portuguese version of the "Guide for using the Uniform Data System for Medical Rehabilitation – version 3.0", as described in Annex 2.

Annex 2. Functionality level of each item in the FIN scale

LEVEL	EQUIVALENCE IN FUNCTIONALITY
7	<b>Complete independence:</b> all the task that involves an activity is performed with safety, without modifications or helpful resources, in reasonable time
6	<b>Modified independence:</b> able to perform tasks with help, needing more time, but performing with safety and totally independent
5	<b>Supervision:</b> individual needs only supervision or verbal commands or models to make the task without necessity of touch and help is only in the preparation of the task when necessary.
4	<b>Minimum assistance:</b> need a minimum quantity of assistance, a simple touch, making it possible the perform the activity (perform 75% of the effort necessary in the task)
3	<b>Moderate assistance:</b> needs a moderate amount of assistance, more than simply touching, (do 50% of the effort necessary in the task)
2	<b>Maximum assistance:</b> utilizes less than 50% of the effort necessary to complete the task, but does not need total help.
1	<b>Total assistance:</b> total assistance is necessary or the task is not performed. Utilizes less than 25% of the effort necessary to make the task.

To evaluate the functional loss the following equation was utilized:

$$FL\% = \frac{(\text{initial functional score} - \text{last functional score})}{(\text{initial functional score})} \times 100\%$$

The application of the VAS and FIM scales was made by the same interviewer directly with the patient without influence of other people on three different occasions. There was a prior period to understand and to train about the scale and to perform a pilot project.

**Statistical analysis**

Due to the nature of the variables, the nominal results (counts) were summarized using absolute and numerical frequencies and percentages and median (Md) and interquartile intervals (IIQ=Q<sub>3</sub> – Q<sub>1</sub>), means and standard deviation [24].

Friedman's test [24] was used for comparisons among the three dependent groups [24].

To evaluate the degree of interrelationships between functional loss and pain the Spearman's correlation coefficient was calculated and the following criteria for the correlation were adopted: i) null: r<sub>s</sub> = 0; ii) weak: 0<r<sub>s</sub><0.3; iii) regular: 0.3 ≤ r<sub>s</sub> <0.6; iv) strong: 0.6 ≤ r<sub>s</sub> <0.9; v) very strong: 0.9 ≤ r<sub>s</sub> < 1 and vi) perfect: r<sub>s</sub> = 1 [24].

For all tests a level of significance of 5% of probability to reject the null hypothesis was adopted.

**RESULTS**

The individuals in the study were divided into three age groups: from 20 to 49 years old, 50 to 69 years old and 70 to 84 years old, with a variation of ages between 20 and 84 years, with the greatest concentration of patients between 50 and 69 years and a median age of 57 years.

The general characteristics of patients and the surgical procedure are summarized in Table 1, in which the physiotherapeutic follow-up is also illustrated during the routine periods (21 patients, 42.9% of whom received physiotherapeutic follow-ups) and non-routine (20 patients, 75.0% of whom received physiotherapeutic follow-ups).

The level of education was principally incomplete high school (up to 14 years old) (77.4%) followed by illiterate (9.4%). The number of days of hospital stay were counted from the first day after heart surgery until the last evaluation day at hospital discharge, with a mean hospital stay of 8.9 ± 2.4 days and mode 7, showing that most of the patients (35.8) were discharged from hospital on the 7<sup>th</sup> postoperative day.

**Evolution of pain intensity**

The results of the intensity of pain are shown in Table 2.

Table 1. General characteristics of 41 patients who were submitted to elective heart surgery from June 2002 to March 2003, in the Heart Surgery Service of HC-FMB/UNESP

Category	Frequency of the patients (n=41)	%
<b>Gender</b>		
Female	16	39.0
Male	25	61.0
<b>age range (years)</b>		
20 to 49	9	22.0
50 to 69	28	68.3
70 to 84	4	9.8
<b>Heart surgery</b>		
First	32	78.0
Reoperation	9	22.0
<b>Type of surgery</b>		
CABG1	31	75.6
V2	10	24.4
<b>CPB</b>		
Yes	29	70.7
No	12	29.3
<b>Physiotherapy (total sample)</b>		
Yes	25	61.0
No	16	39.0
<b>Physiotherapy follow-up</b>		
<b>Routine</b>		
Yes	9	42.9
No	12	57.1
<b>Non-routine</b>		
Yes	15	75.0
No	5	25.0

1 - CABG = Coronary artery bypass grafting; 2 - V = valve surgery

A comparison among the three periods was considered significant, demonstrating an increase in the intensity of pain with a median of about 3 at hospital discharge.

Moderate pain occurred more on the 7<sup>th</sup> PO day and at hospital discharge.

On the 7<sup>th</sup> PO day it was observed that analgesia was only used “if necessary”; oral dipyrone was prescribed for all patients but, at the moment of data collection, the patients reported that they had not received medication on that day.

**Evolution of the level of functionality**

In reference to the FIM scale, statistically significant differences were observed in all categories of functionality and between the times of measurement. The most accentuated decrease was seen on the 7<sup>th</sup> PO day in all categories (Table 3).

In respect to the %FL, a statistically significant difference of functional loss was observed among the studied periods for all categories (Table 4).

**Relationship between the functionality, (categories and total) and subgroups (gender, age, type of surgery, first surgery or reoperation and CPB)**

In the preoperative period, when a correlation of the functionality and the subgroups was made, a significant difference was only noted for the age, with the highest score in the 20 to 49-year age range and the lowest in the 70 to 84-year age range.

On the 7<sup>th</sup> PO day, when the functionality was compared among the subgroups to analyze the categories: Personal Care, Mobility/Transference and Movement were observed, a significant difference was observed only for gender (p<0.01), with men having better functionality compared to women; in the other subgroups non-significant differences were observed.

In the analysis of the total FIM score on the 7<sup>th</sup> PO day, a significant difference was observed for gender both among the groups and between the periods (p<0.01; p=0.04), with men and patients from non-routine periods having better overall functionality; in all the other groups non-significant differences were observed.

Table 2. Measurement of position and spread, results of tests and commentary in the preoperative period, on the 7th PO day and at hospital discharge, in reference to pain

Scale (n=41)	PREOPERATIVE			7 <sup>th</sup> PO			HOSPITAL DISCHARGE			Friedman Test <sup>3</sup> (T)	Commentary
	Md	IIQ	mean	Md	IIQ	mean	Md	IIQ	mean		
VAS	0.0	0.0	1.0	3.2	1.2	2.7	3.0	1.0	2.3	T = 71.4 p < 0.01	7 <sup>th</sup> PO > Hosp Dis > Pre

1- Md = median; 2 - IIQ= Q3-Q1 ; 3 – Friedman’s test taking into account the mean in each group.

Table 3. Measurements of position, spread, results of tests and commentaries among the preoperative, 7<sup>th</sup> PO day and Hospital Discharge periods according to the categories: Personal Care, Mobility/Transference, Movement and total FIM scores.

PREOPERATIVE			7 <sup>th</sup> PO			HOSPITAL DISCHARGE			Friedman Test <sup>3</sup> (T)	Commentary
Md	IIQ	Mean	Md	IIQ	Mean	Md	IIQ	Mean		
PERSONAL CARE (n=41)										
42.0	0.0	2.9	37.0	7.0	1.4	38.0	3.5	1.7	59.2 p<0.01	Pre>Hosp. Dis>7 <sup>th</sup> PO
MOBILITY / TRANSFERENCE (n=41)										
21.0	0.0	2.9	18.0	2.5	1.4	18.0	0.0	1.7	58.3 p<0.01	Pre>Hosp. Dis>7 <sup>th</sup> PO
MOVEMENT (n=41)										
14.0	0.0	2.9	7.0	1.5	1.4	7.0	2.0	1.7	60.5 p<0.01	Pre>Hosp. Dis>7 <sup>th</sup> PO
TOTAL FIM SCORE (n=41)										
77.0	0.0	2.9	61.0	9.0	1.3	63.0	6.5	1.8	60.6 p<0.01	Pre>Hosp. Dis>7 <sup>th</sup> PO

1-Md = median; 2 - IIQ= Q3-Q1 ; 3 - Friedman's Test taking into account the mean in each group

Table 4. Measurements of position, spread, results of tests and commentary among the Preoperative period, 7th PO day and Hospital Discharge, according to the categories Personal Care, Mobility/Transference, Movement and Total FIM score.

FL% A=(initial=pre/ final=7 <sup>th</sup> PO)			FL% B=(initial=pré/ final=hospital discharge)			FL% C=(initial=7 <sup>th</sup> PO/ final=hospital discharge)			Friedman Test <sup>3</sup> (T)	Comentary
Md	IIQ	mean	Md	IIQ	mean	Md	IIQ	mean		
PERSONAL CARE (n=41)										
11.9	10.7	2.6	9.5	7.2	2.3	0.0	6.0	1.1	64.9 p < 0.01	FL%A > FL%B > FL%C
MOBILITY / TRANSFERENCE (n=41)										
14.3	5.2	2.6	14.3	2.4	2.3	0.0	8.5	1.1	61.2 p < 0.01	FL%A > FL%B > FL%C
MOVEMENT (n=41)										
50.0	23.9	2.6	50.0	19.2	2.3	0.0	16.7	1.1	57.1 p < 0.01	FL%A > FL%B > FL%C
TOTAL FIM SCORE (n=41)										
18.2	13.2	2.7	16.9	7.8	2.2	0.0	7.2	1.1	66.8 p < 0.01	FL%A > FL%B > FL%C

1- Md = Median; 2 - IIQ= Q3-Q1; 3- Friedman's test taking into account the mean in each group.

**Correlation of the functional loss and pain**

Significant agreement in the reduction in pain was noticed between the 7<sup>th</sup> PO day and hospital discharge (rs = -0.41; p<0.01).

The correlations between reduction in pain and functional loss in all categories, demonstrated significant disagreements (Table 5). This difference demonstrated that there was an improvement of the functionality between the 7<sup>th</sup> PO day and hospital discharge and the contribution of this improvement was a decrease in pain between the 7<sup>th</sup> PO day and hospital discharge.

Table 5. Correlations between total percentage Functional Loss and percentage gradient of pain increase on the scale

CORRELATIONS	n	rSpearman	p
tFL 7PO discharge x tFL pre 7PO	41	- 0.41	< 0.01
tFL 7PO discharge x pain G VAS 7PO discharge	41	- 0.47	< 0.01
FL 7PO discharge x PFcp pre 7PO	41	- 0.42	< 0.01
FLcp 7PO discharge x pain G VAS	41	- 0.35	< 0.01
FLmt 7POdischarge x FLmt pre 7PO	41	- 0.47	< 0.01
FLmt 7PO discharge x pain G VAS 7POdischarge	41	- 0.49	< 0.01
FL loc 7PO discharge x PF loc pre 7PO	41	- 0.54	< 0.01
FL loc 7PO discharge x pain G VAS 7PO discharge	41	- 0.49	< 0.01

**DISCUSSION**

**Pain**

In the preoperative period, the intensity of pain for all patients was zero. On the 7<sup>th</sup> PO day, the VAS scale presented a median intensity of 3.2, signifying moderate pain for the majority of patients, similar to the results of Teixeira & Valverde Filho [25] and Mueller et al. [26].

At hospital discharge, the median pain intensity was similar to the pain reported on the 7<sup>th</sup> PO day (3.0); this was considered moderate pain (56.9%).

There was a significant difference in respect to pain comparing the preoperative period, the 7<sup>th</sup> PO day and hospital discharge. The greatest pain was on the 7<sup>th</sup> PO day with a reduction before hospital discharge, therefore agreeing with the results of Bucerius et al. [3]. The patients reported that even the highest intensity of pain was tolerable. However this level of pain increased with coughing or when exerting effort to move, as was reported by Walther et al. [2], Bucerius et al. [3] and Mueller et al. [26], who said that the pain in the thoracic region after heart surgery is tolerable, as long as the sternum and the ribs are stable, a condition also

verified in the patients of this study. Nevertheless, whether the pain in the postoperative period of heart surgery is acceptable or tolerable is questioned by Pimenta et al. [4], as there is no parameter for comparison.

In this study, the approach to postoperative pain was an important focal point due to its involvement in the overall state of the patient. As is well known, with pain the patient reduces his movements, avoids deep breaths and sleeps less, causing physical tiredness and less interest in the treatment [4, 27]. Hence, Pimenta et al. [4] and Teixeira & Valverde Filho [25] recommend control of pain as a preventative measure in the overall treatment of the patient.

**Considerations related to functionality**

This study demonstrated that surgical interventions cause changes in the functional capacity in agreement to the results of Myles et al. [22], who stated that heart surgery is associated to specific damage in the functionality and ability of patients. The scores of the categories: Personal Care, Mobility/Transference and Movement and the total FIM score, when comparing the preoperative, 7<sup>th</sup> PO day and hospital discharge, demonstrated a significant reduction in functionality.

The total score on the 7<sup>th</sup> PO day compared to the preoperative period demonstrated a functional loss of 18.2%; at hospital discharge the functionality was similar to the 7<sup>th</sup> PO day, but, even so with a significant reduction when compared to the preoperative period with a functional loss of 16.9%. This decrease in the functional capacity is similar to the loss reported by Christiansen et al. [9]; it is not considered a deficiency or incapacity, but, in some cases, it can become an established functional limitation.

**Preoperative period**

When the functionality in the preoperative period was compared between the age subgroups, the result was significant for all categories; younger patients presented with better functionality than older patients. It is clear that elderly patients need special care and functional assessment is important in geriatrics, with the aim of carefully placing the elderly back in society, as was suggested by Lawton [8], Pollack et al. [28] and Rigolin [16].

**Seventh postoperative day**

The best score was seen in patients who required supervision only in respect to going up and coming down stairs with independence for all other items. This patient was different to the others, as in addition to daily physiotherapy sessions, presented with less pain.

The lowest number of points was for a patient who was the only case who suffered from a postoperative stroke and who required much assistance in all activities and so had

the lowest values in all categories.

The category of Movement presented the greatest functional loss in the postoperative period compared to the preoperative period (50%); when evaluating activities in the subgroups, a significant association between the routine and non-routine periods of physiotherapy was observed. Physiotherapy in the non-routine period involved 15 patients, showing that, due to the availability of trainee physiotherapists, a continuous treatment was possible including training in walking and going up-stairs and down-stairs, offering a better functional performance compared to patients who did not receive physiotherapy. This improved performance was also verified when the periods were compared, as even though nine patients received physiotherapy in the routine period, due to the great number of patients and too few professionals, this treatment only focused on respiration, demonstrating that rehabilitation of heart patients in phase I (in hospital) is not performed for all aspects; the preference is still related to breathing, with functional preparation in second place.

In all categories, it was observed that there is a significant difference between men and women, that is, men have better functional performance for activities.

#### **Hospital discharge**

Hospital discharge varied from the 7<sup>th</sup> PO to the 17<sup>th</sup> PO day showing the socioeconomic difficulties of these patients. Hence, the moment of the hospital discharge was not correlated to the subgroups.

The maximum number of points was for one specific patient who presented with a high level of independence for the Movement category, even though he was still slow during some activities. The least number of points was for a patient who suffered a stroke in the postoperative period, which is secondary deficit with this complication.

The lowest functional loss occurred in the Personal Care category when compared to the preoperative period (9.5%). Patients presented the greatest functionality in respect to the food item.

Three patients did not present functional loss in the Mobility/Transference category, but the median functional loss in comparison to the preoperative period was 11.9%. Patients presented greater functionality in respect to going to the bathroom.

The greatest median functional loss was seen in the Movement Category when compared to the preoperative period (50%), however the two patients who required total assistance in the preoperative period due to the necessity of rest, presented with functional benefits at hospital discharge. From this result we see that the FIM instrument representing the patient's functional capacity at the moment of its application, reflected the real benefits over the study

period, as was also reported by Berg-Emons et al. [12] and Ottenbacher et al. [14].

Still considering the Movement category, both on the 7<sup>th</sup> PO day and at hospital discharge patients presented with less functionality in respect to going up and down stairs. These results demonstrated that even with the physiotherapist managing to help some patients, those who did not receive help reported that they did not realize that going up and down stairs was permitted and would not perform this activity without authorization from the doctor. This situation was unexpected, as the phases of heart rehabilitation are duly documented in the literature that states that in phase I, from the 5<sup>th</sup> to 7<sup>th</sup> PO day, patients must be able to go up and down stairs involving 8 to 10 steps [18, 26]. Hence, there is a necessity to explain all aspects of heart rehabilitation, including an educational program at hospital discharge. These considerations are recommended by Thonson et al. [18], when they state that patients, to be released from hospital should be confident in their capacity to face everyday situations.

#### **Considerations and comparisons about pain and functionality**

According to the literature, the algic state interferes in the evolution in the postoperative period, as the patient avoids certain activities [4, 25,27], in this study, the reduction in the pain level from the 7<sup>th</sup> PO day to hospital discharge contributed to high levels of functionality.

The total functionality score, between the preoperative period and hospital discharge, demonstrated the reduction of the functional capacity related to pain. This reduction can be a relevant factor in respect to hospital discharge and in the satisfactory levels of recovery of patients as was supported by Myles et al. [22].

The correlation between postoperative pain and functionality is implicated in the quality of life and is considered an important final circumstance of heart surgery patients [2]. In this study, the approach to assessment also presupposed not only to measure and describe the impact of surgical intervention on the capacity of patients to perform day-to-day tasks, but, also to provide elements for a more efficacious treatment, preserving the functional state and well-being of patients.

#### **CONCLUSIONS**

1. The level of pain in the postoperative period was higher on the 7<sup>th</sup> PO day, when compared to hospital discharge and had a significant repercussion on the functionality.
2. After heart surgery, patients presented with damage to the functional capacity. The functionality level was lower

on the 7<sup>th</sup> PO day compared to hospital discharge with significant changes in day-to-day activities. This damage can affect the quality of life and must be considered an important factor in the prognosis at hospital discharge.

3. In the preoperative period, the youngest patients presented with higher functionality. The levels diminished with age and the least functionality was seen in over 70-year-old patients.

4. Physiotherapy has proved important for postoperative recovery, mainly in relation to movement.

5. The assessment made in the preoperative period provided useful and practical measures of what can be achieved. The assessment performed on the 7<sup>th</sup> PO day and at hospital discharge classified the patients according to loss and benefits, indicating those that needed more care and training in their capacities.

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