

## Correlation between the Time Up to Go and Functionality in Patients Undergoig Cardiac Surgery

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### Abstract

**Introduction:** The application of functional scales in critically ill patients is of extreme importance for the physiotherapist, since the main goal is to minimize the functional loss acquired, as well as preserving the ability to maintain the skills necessary to perform daily activities, with emphasis on transference and locomotion.

**Objective:** To correlate Time Up to Go (TUG) with the functionality of patients undergoing cardiac surgery.

**Methodology:** This is a cross-sectional study, carried out with the patients hospitalized at the hospitalization unit of a reference hospital in cardiology in the interior of Bahia. Initially the TUG evaluation was performed, the time spent to perform this test was quantified and correlated with the functional independence through the application of Functional Independence Measurement (MIF).

**Results:** Fifty patients were included, with a prevalence of males with 31 (62%) participants and mean age of  $58 \pm 12$  years. Patients were assessed at the time of drainage, and this occurred on average on the fourth postoperative day. The functional independence assessed by the MIF at that time was at  $87 \pm 17$  while the time taken to perform the Time Up to Go was  $13 \pm 4$  seconds. The analysis of these two variables showed a strong positive correlation with  $r = 0.82$  and with statistical significance ( $p < 0.001$ ).

**Conclusion:** Based on these results, there is a positive correlation between the performance during TUG and the functionality of patients undergoing cardiac surgery.

**Keywords:** Functionality; Thoracic surgery; Physiotherapy

### Introduction

Population aging, obesity, smoking, sedentary lifestyle, and systemic arterial hypertension are important risk factors for heart disease. With increased incidence of cardiovascular disease is increasing the need for brokers treatments such as heart surgery, being that associated with decline in pulmonary function and impacting on the peripheral functionality of these patients [1,2].

The functional independence measure (FIM) main objective is to measure the degree of third party care request for a set of 18 activities [3]. FIM helps to understand the difficulties of individuals and objective the therapeutic plan, interest in quantifying the functionality of the individual emerged from the relationship between the quality of life for daily life activities. In the postoperative period of cardiac surgery, the FIM is important in order to assess the loss of physical and psychological parts of the patient, since it is necessary a precise quantification, because of subjectivity [4].

Walk tests are used since 1960 and the six-minute walk test (6MWT) is well tolerated and closer to the diary life activities [5]. In clinical evaluation is essential to measuring physical mobility. One of the tests used, the speed of the March is a simple, fast and easy to get [6].

The application of scales of functionality in critical patients is of extreme importance to the physical therapist, because this has as main objective to minimize the functional loss acquired, in addition to preserve the ability to maintain the skills needed to implementation of daily activities, with emphasis on transfer and locomotion. So the Time Up to Go appears as a well consolidated tool for elderly population, but without evidence when we think of surgical patients [7].

The assessment of functional performance is seen increasingly as a precious measure of results in clinical trials and are commonly used for identification of diagnosis, prognosis and to compare the response to treatment of patients, as well as verifying and monitoring the performance of the capability to guide the therapist on development of treatments and prevention of physical disability [8].

In the literature there is a gap on the performance of surgical patients during TUG and its inference regarding postoperative functionality. Based on this, the objective of this study was to correlate preoperative gait velocity with postoperative functionality in patients submitted to a cardiac surgical procedure.

In the literature there is a gap on the performance of surgical patients during the TUG and your inference in relation to functionality in the postoperative period. Based on this, the objective of this study was to correlate the preoperative running speed with the postoperative patients undergoing a surgical procedure.

## Material and Methods

This is a cross-sectional study, conducted with patients admitted to the inpatient unit of a reference hospital in cardiology in the interior of Bahia. The study was approved by the Research Ethics Committee of the College of Feira de Santana- Bahia, on the opinion number 2.088.662. All the participants signed an informed consent form.

The inclusion criteria for this study were patients older than 18 years of age, of both genders, and undergoing valve replacement surgery or myocardial revascularization through the outpatient clinic and using extracorporeal surgery. On the other hand, inclusion criteria were patients with physical limitations that made the proposed tests impossible, arrhythmia at the time of evaluation, hemodynamic instability, patients who were unable to respond to the functional scale, with a time of stay in the Intensive Care Unit for more than four days and using thoracic drain.

Initially the Time Up to Go (TUG) evaluation was performed, where the patient was asked to sit upright in the chair, hands on his thighs and feet resting on the floor and soon after getting up from the chair, walking up to a marker to 3 meters, to turn around and return to the chair sitting as fast as possible. Remembering that you should not run though it is a test that aims to walk as fast as possible.

The TUG test consists of getting up from a chair with arms, walking 3 meters in a straight line, turning around, returning to the place of departure and sitting in the chair. During the execution of the test the individual should walk comfortably and safely and without any physical assistance. To begin the test, the verbal command "go" was given and the timer was triggered at the first previous movement of the trunk and ceased when it was leaning against the chair [9].

It is noteworthy that patients had their heart rate, systemic blood pressure, respiratory rate and peripheral oxygen saturation before and after the test.

The time spent in performing this test was quantified and correlated with functional independence through the application of Functional Independence Measurement (FIM).

FIM is an instrument that assesses the disability of patients with functional restrictions of various causes; quantitatively evaluates the care load demanded by a person for the performance of motor and cognitive tasks of daily living<sup>3</sup>.

These sub items are evaluated on a scale of 1 to 7, which correspond to the level of dependency / independence of the individual in each task, with a score of 1 indicating that the patient needs total help to perform the activity and the score 7 being able to do it without help. The values of the MIF items are summed, resulting in scores that can vary from 18 to 126 points, showing the functional level that the patient is in relation to the tasks evaluated.

Statistical Package for Social Sciences (SPSS) 20.0 was used to evaluate the data. Normality was assessed using the Kolmogorov-Smirnov Test. Continuous variables were expressed as mean and standard deviation. Pearson's correlation test was used to correlate the data. It was considered statistically significant when a  $p < 0.05$ .

## Results

During the research period were 55 patients admitted for heart surgery. Of these, 5 were excluded due to one with physical limitation and four refused to participate in the research. Thus, were included 50 patients being male prevalence with 31 (62%) participants and with an average age of  $58 \pm 12$  years. The remaining data is expressed in Table 1.

Variable	N
<b>Genre</b>	
<b>Male</b>	31 (62%)
<b>Female</b>	19 (38%)
<b>Age (years)</b>	58 ± 12
<b>IMC (kg/m<sup>2</sup>)</b>	24 ± 11
<b>Comorbidities</b>	
<b>Systemic Arterial Hypertension</b>	19 (38%)
<b>Diabetes Mellitus</b>	15 (30%)
<b>Dyslipidemia</b>	15 (30%)
<b>Acute myocardial infarction</b>	5 (10%)
<b>Smoking</b>	8 (16%)
<b>Time to CPB (min)</b>	88 ± 12
<b>Time to MV (horas)</b>	7 ± 2
<b>Time to admission (dias)</b>	4 ± 2

BMI: Body Mass Index; CPB: Cardiopulmonary Bypass; MV: Mechanical Ventilation

**Table 1:** Surgical and clinical data of the patient's studied

Patients were evaluated at the time of removal of drains, and this occurred on average on the fourth postoperative day. The functional independence evaluated by MIF in that moment was in  $87 \pm 17$  while the time spent for realization of the Team Up to Go was of  $13 \pm 4$  seconds. The analysis of these two variables showed a strong positive correlation with a  $r = 0.82$  and with statistical significance ( $p < 0.001$ ). Other correlation analysis is displayed in Table 2.

Variable	FIM	
	r <sup>a</sup>	P
<b>Age</b>	0,07	0,64
<b>Time to MV</b>	0,55	<0,001
<b>Time to ECC</b>	0,13	0,45
<b>TUG</b>	0,82	<0,001

**Table 2:** Correlation between FIM and TUG the Pearson correlation coefficient

## Discussion

Based on the results it was observed that there is a positive correlation between the functional independence and the time to perform Time Up to Go.

The TUG is a tool used for functional evaluation, mainly of the elderly. When it comes to the application in patients undergoing heart surgery, no studies were found associated with this test. However, some factors are associated with functional decline after cardiac surgery, such as body mass index, type of surgery and time of extracorporeal circulation[10]. In the present study, we did not visualize a correlation between CPB time and postoperative FIM.

However, in a study of patients with heart disease who underwent cardiac surgery with the use of extracorporeal circulation showed that the duration of prolonged CPB interfered with the patient's functionality, showing a lower score at the time of discharge from the FIM [11]. Other studies indicate that MV time is an independent factor of functional capacity worsening[10], reduction of respiratory muscle strength and peripheral [12,13].

Niemeyer-Guimarães, *et al.* evaluated 33 elderly patients undergoing myocardial revascularization surgery and concluded that FIM is an interesting tool to evaluate this patient profile, mainly to predict functionality in the subgroup presenting complications [14].

During the TUG, there is the possibility of quantifying gait speed, even though this is not the best form of evaluation. For Cordeiro, *et al.* there is no strong association between the length of hospitalization and gait velocity in surgically treated patients [15]. It is worth mentioning that this evaluation was performed on the day of hospital discharge while in the present study the TUG was applied on average on the fourth day of hospitalization.

The best test for evaluation of the submaximal functional capacity is the six-minute walk (6MWT), but others are seen to appear and to be similar to the 6MWT. Kamiya, *et al.* compared this test with walking speed, evaluated through the 10-meter test, showing a similar predictive prognosis [16]. Investigations should be encouraged in the direction of drawing a parallel between the gold standard, TC6M and the TUG.'

Santos, *et al.* evaluated the risk of falls in the elderly who underwent cardiac surgery through the Romberg, TUG and Medical Research Council, which respectively evaluated static balance, dynamic balance and muscle strength, with the result that the elderly are at high risk when the MRC test is low, time to perform the longest TUG [17].

Another component that is associated with worsening of functionality is pain<sup>4</sup>. In this study the authors demonstrate that the presence of pleural drainage is a limiting factor and, therefore, associated with functional worsening. Due to this reason we chose to perform the test after the drains have been removed. Cordeiro, *et al.* presented a relationship between surgical risk and functionality; however in the present study we did not evaluate the risk score due to institutional issues [18].

Some features can be used to optimize the functional independence of patients undergoing cardiac surgery, such as cycloergometry, aerobic exercises, resisted exercises, virtual reality and inspiratory muscle training [19-23]. A clinical trial should be encouraged in an attempt to test the hypothesis that the application of these resources is also associated with a shorter duration of Time Up to Go.

## Conclusions

It is concluded that functional independence has a positive correlation with Time Up to Go. Therefore, the latter seems to be an alternative for the functional evaluation of patients undergoing cardiac surgery.

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