



Revista da Escola de Enfermagem da USP

ISSN: 0080-6234

reeusp@usp.br

Universidade de São Paulo

Brasil

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Revista da Escola de Enfermagem da USP, vol. 46, núm. 1, outubro, 2012, pp. 30-37

Universidade de São Paulo

São Paulo, Brasil

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# Post-traumatic amnesia and post-trauma quality of life

AMNÉSIA PÓS-TRAUMÁTICA E QUALIDADE DE VIDA PÓS-TRAUMA

AMNESIA POST-TRAUMÁTICA Y CALIDAD DE VIDA POST-TRAUMA

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## ABSTRACT

The present study aims to compare quality of life of victims with long and short term post-traumatic amnesia and to analyze the relation between quality of life and length of amnesia, including or not the comatose period. This prospective cohort study, gathered data during the hospital stay and 3 and 6 months post-trauma. Blunt traumatic brain injury patients, over 14 years old, with no prior diagnosis of dementia or brain injury, admitted to a trauma center 12 hours post-trauma were included. The results were unfavorable among patients with long term amnesia. Correlation between length of post-traumatic amnesia and quality of life domains were more expressive when excluded comatose period, indicating that it must not be computed in the length of post-traumatic amnesia.

## RESUMO

Este estudo compara a qualidade de vida das vítimas que apresentaram amnésia pós-traumática de longa duração com as demais e analisa a relação entre qualidade de vida e duração da amnésia pós-traumática, computando ou não o período de coma. Estudo de coorte prospectivo, com coleta de dados durante a internação hospitalar e avaliação da qualidade de vida no período de estabilidade da recuperação pós-traumática. Participaram desta investigação vítimas de trauma crânio-encefálico contuso, maiores de 14 anos, sem antecedentes de demência ou trauma crânio-encefálico, internadas em hospital de referência para atendimento de trauma nas primeiras 12 horas pós-evento. Os resultados referentes à qualidade de vida foram mais desfavoráveis em três domínios do grupo com amnésia de longa duração. Correlações entre duração da amnésia e domínios de qualidade de vida foram mais expressivas quando excluído o período de coma, indicando que este tempo não deve ser computado na duração da amnésia pós-traumática.

## RESUMEN

Este estudio tuvo como objetivo comparar la calidad de vida de las víctimas que tuvieron amnesia post-traumática a largo plazo, con los (las) demás y analizar la relación entre la calidad de vida y duración de la amnesia post-traumática, computando o no el periodo de estado de coma. Estudio prospectivo de cohorte utilizando datos de hospitalizaciones y de la calidad de vida de víctimas de traumatismo craneoencefálico, internados en un hospital de referencia para la atención del trauma. Los resultados relativos a la calidad de vida eran más desfavorables en el grupo a largo plazo de amnesia. Las correlaciones entre la duración de la amnesia post-traumática y los dominios de la calidad de vida fueron más significativos cuando se excluyó el periodo de estado de coma, lo que indica que este tiempo no debe ser contado en la duración de la amnesia post-traumática.

## DESCRIPTORS

Craniocerebral trauma  
Amnesia  
Amnesia, transient global  
Quality of life

## DESCRIPTORES

Traumatismos craniocerebrais  
Amnésia  
Amnésia global transitória  
Qualidade de vida

## DESCRIPTORES

Traumatismos craneocerebrales  
Amnesia  
Amnesia global transitoria  
Calidad de vida

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## INTRODUCTION

Closed traumatic brain injury (CTBI) is frequently followed by the post-traumatic amnesia (PTA), defined as a transitory state of confusion and disorientation, characterized for anterograde amnesia and behavioral disturbances, including sleeplessness, psychomotor agitation, fatigue, confabulation and occasionally serious affective and psychotic symptoms<sup>(1-2)</sup>. Post-traumatic amnesia is considered an indicator of the severity of the CTBI and an important element in predicting functional outcomes<sup>(1,3)</sup>; the longer the post-traumatic amnesia period, the more severe the CTBI and the worse the expected functional outcome<sup>(2)</sup>.

Brain injuries, due to the range of the functions of the nervous system, result in impairments and disabilities that are characterized as causing losses or alterations in both the physical and mental spheres, with the mental capacity of the patients altered not only in cognitive, but also behavioral areas. Regarding the evolution, the consequences of brain injury go beyond the impact in the acute phase of treatment, extending and modifying for a long period after the traumatic event<sup>(4)</sup>. Consequently, the time of six months after the trauma has been recommended for evaluating the consequences in surviving victims, however, the risk of loss of large numbers of patients during longitudinal studies has indicated the period of three months for this evaluation, especially in studies which include mild trauma victims<sup>(5)</sup>.

Researchers have highlighted that the relationship between disability and social disadvantage is complex and the result of the use of objective measures of physical and mental functions which often correlate poorly with the individual perception of harm from the trauma, therefore they consider the measure of quality of life to be potentially better to express the post-trauma consequences<sup>(6)</sup>. In seeking to encompass the different consequences of the CTBI and to portray the result of their interaction, this study used the quality of life evaluation to characterize the consequences of the CTBI, since the physical, behavioral and cognitive impairments that occur as brain injury sequelae are capable of causing significant alterations in the life of the patient<sup>(4)</sup>.

Although quality of life is being extensively studied in many areas of medicine, in Brazil there are few studies on quality of life after CTBI. Furthermore, no studies were found in the literature regarding the relationship between duration of PTA and post-trauma quality of life. Consequently, to contribute to this knowledge was one of the aims of the present study. Another focus of this study was the difference in the criteria for defining the duration of the PTA. The traditional criteria, includes the period of the coma in its duration<sup>(7)</sup>. However, for some researchers, including the duration of the coma is inadequate, since this makes the duration of APT equal for individu-

als who remain unconscious for long periods and those who present a short coma period, but a long period of post-traumatic confusion. These researchers recommend that the timing of PTA is started from the moment when the patient recovers from the coma. The frequent use of sedation as a therapeutic tool for patients with traumatic brain injury (TBI) also is presented as an argument for this criterion. Although the reasoning of these authors is valid, this new proposition is not universally accepted<sup>(8)</sup>. Thus, in some studies, the duration of PTA is the interval between the trauma and the return of the continuous memory, while in others the beginning of this time interval is the end of the coma<sup>(7-9)</sup>. This divergence undoubtedly results in losses in the knowledge of this phase of post-traumatic recuperation. The literature is extensive on PTA after CTBI, however, many results can not be compared due to the differences in the ways of measuring its duration.

There is no obvious evidence for the definition that should be used to determine the duration of the PTA. Studies which compare the two methods of determining the duration of the PTA are needed to establish a single operational concept that can be safely used. Considering the issues raised, the aims of this study were: to compare the quality of life (QoL) of victims who presented long and short duration PTA and to analyze the relationship between post-trauma quality of life and the duration of the post-traumatic amnesia, including or not the coma period.

## METHOD

This is a prospective cohort study, with a descriptive correlational approach with two distinct data collection stages. The first stage, which aimed to characterize the duration of the PTA period was performed during the hospitalization due to brain injury. The second step, which aimed to evaluate the QoL after discharge was performed between 3 and 6 months after the CTBI, the period in which the victims of this type of injury begin to present stability in their post-traumatic recovery<sup>(5)</sup>.

The study was conducted in the Clinical Hospital of the University of São Paulo Faculty of Medicine (HCFMUSP), government institution, located in São Paulo city and a reference center for the care of trauma victims. The targets of this investigation were CTBI victims, treated in the first 12 hours after the traumatic event in the Emergency Unit of the hospital and hospitalized between December 2006 and October 2007. Victims with a history of dementia or TBI were excluded from the sample, as were those under 14 years of age, taking into account the restriction of the application of the Medical Outcome Study 36-Item Short Form Health Survey (SF-36) instrument for individuals in this age group<sup>(10)</sup>.

...no studies  
were found in the  
literature regarding  
the relationship  
between duration  
of PTA and  
post-trauma  
quality of life.

In this study, the Galveston Orientation Amnesia Test (GOAT)<sup>(9,11)</sup> was used for the evaluation of the PTA and SF-36<sup>(10)</sup> was applied to measure the QoL of the victims. The GOAT is an instrument which consists of 10 questions that assess orientation and amnesia of CTBI victims after the injury. In addition to the temporal orientation of the patient (questions 6 to 10), as the patient recovering from a CTBI often gets confused about basic information, the GOAT presents questions regarding name, address and date of birth (question 1). Memory distortions may involve alterations in geographic orientation, so the instrument also poses questions about that aspect (question 2). Question 3 refers to the date of admission to hospital and questions 4 and 5 ask the victim about events that happened before and after the injury, respectively. In the application of the GOAT, all this information must be confirmed through the patient's medical records or family members. The PTA is considered over when the victim achieves, for two consecutive days, scores greater than or equal to 75 in the test<sup>(1,7,9)</sup>.

The SF-36 is a questionnaire consisting of 36 items, divided into eight domains: functional capacity (ten items), physical activity limitations (four items), pain (two items), general health status (five items), vitality (four items), social activities (two items), emotional aspects (three items), mental health (five items) and one evaluation question that allows the comparison of the current health condition with that of a year before<sup>(10)</sup>. In this study this question was adapted for cases of trauma and the focus was modified for the comparison of the current health status with that of the period preceding the trauma.

The study was approved by the Research Ethics Committee (Protocol No. 1050/06). The inclusion of the victims in the study occurred only in cases in which there was consent of the patient or their family members and signing the Terms of Free Prior Informed Consent. The monitoring of the CTBI victims, treated in the Emergency Unit of the Central Institute of the HCFMUSP in first the 12 hours after the traumatic event and hospitalized in the hospital was carried out daily. The identification of the study participants was performed through means of daily consultation of the medical records of the inpatients in this hospital area and, also, consultation with the nurses and physicians of the sector.

In the first phase, the patients were evaluated daily, preferably at the same hour, from their inclusion in the study until the moment of hospital discharge or transfer, death or end of the period of PTA. The Glasgow Coma Scale (GCS) was applied with all patients included in the study. The GOAT was also applied, after the GCS, with the patients with preserved verbal contact capacity. In the second data collection phase, the patients were interviewed by telephone or at the Neurology Outpatient Clinic, on a date set at a previous contact with the patient or family member. This interview was scheduled, on average, 154 days after the trauma, considering the period between three and six months after the event and aiming to

measure the quality of life of the victims in a period close to the stability of the recovery process. Regarding these telephone contacts, it was established that after two unsuccessful attempts to interview the patient by telephone the individual would be excluded from the monitoring.

The duration of the PTA was determined, in days, using two different criteria. In the first, the duration of the amnesia was determined as the difference in days between the date of the trauma and the first two consecutive days in which the victim scored  $\geq 75$  in the GOAT<sup>(7)</sup>. The second value was determined as the difference in days between the first of two days in which the patient achieved a score of 6 in the Best Motor Response (BMR) parameter of the GCS and the first of two sequential days with scores greater than or equal to 75 in the GOAT<sup>(7)</sup>. In this study, PTA over 24 hours was considered to be of long duration, since in the classifications of severity of the CTBI according to the duration of the PTA a period longer than 24 hours is indicative of a significant lesion, i.e. moderate or severe gravity of trauma<sup>(1)</sup>. In the comparison between the short and long duration groups, the length of APT was established excluding the period of coma, as the results of the present study indicate that this is the best measurement method.

Upon completion of the data collection, the data were stored in a computerized database. For the data analysis, SPSS for Windows 12.0 e Stata 8.0 were used. Descriptive statistics were performed for all variables, aiming for the general characterization of the study participants and description of the QoL of the victims. The Pearson's Chi-square test was used to compare the group of victims who participated in the first phase (187 participants) of this study with those who had their quality of life evaluated between three and six months post-trauma (68 participants). In these analyzes, the numerical variables related to the severity of the trauma were categorized according to indication of the indices used and the age, conforming to the categories presented in Table 1. The reliability of the SF-36 was analyzed using the Cronbach's alpha test, which produced values ranging between 0.74 and 0.95, with the lowest value being for the General Health Status domain and the highest for the Functional Capacity domain. The Kolmogorov-Smirnov normality test was used to test the hypothesis of normality for the total score of the SF-36 domains and for the duration of the PTA in days, determined by the two previously described methods.

A comparison of the means of the SF-36 domains between the groups with short and long duration PTA was performed using the Student's t-test, where the data presented normal distribution and by the Mann-Whitney test where the hypothesis of normality of the total score of the domains was rejected. Spearman's Rank Correlation Coefficient was used to evaluate the association between the total score of the SF-36 domains and duration in days of the PTA including or not the coma period. All the statistical tests were performed assuming a type 1 error of 5%.

## RESULTS

Of the 187 patients evaluated during the hospitalization phase, 68 (36.4%) had their quality of life evaluated between three and six months after the traumatic event. There were 29 victims who could not be located after discharge (erroneous contact information); five died between hospital discharge and the telephone call; and 85 were excluded from the second stage of the research, refusing to participate or not being available for the interview at the two telephone contact moments. Although the study group evaluated by the SF-36 was composed of only 36.4% of the participants of the first phase, the results of Person's Chi-Square test confirmed the similarity of the participants of the two phases of the study regarding the variables: gender, age, external cause, severity of the TBI according to the GCS and Maximum Abbreviated Injury Scale (MAIS) related to the head region; type (diffused or localized), area (intra or extra axial) and quantity (single or multiple) of craniocerebral injuries, and use of medication with central nervous system action in the acute phase of the trauma treatment. The proportion of individuals with short and long duration PTA was also similar in the two phases of this study.

The analysis of the characteristics of the 68 interviewees in the second step of the study showed that the most common external causes that provoked CTBI were traffic accidents (60.3%), followed by falls (30.9%). Assaults accounted for only 8.8% of the cases. The initial results of the GCS of these 68 participants indicated that the majority of the cases presented mild TBI (57.3%), 17.6% moderate and 25% severe TBI. However, the MAIS related to the head region indicated the presence of at least one major injury (MAIS  $\geq 3$ ) in 73.5% of the victims. Furthermore, the majority of these patients presented localized brain injuries (85.3%) and the number of victims with intra-axial injuries was similar to those who presented only extra-axial injuries (50.0%). Phenytoin (Hidantal®) or Midazolam Maleate (Dormonid®) were the central nervous system acting drugs most commonly used in the acute phase of treatment of the victims, in 64.7% of the cases. Other drugs with this action were used with approximately 7% of the victims.

Table 1 shows that the majority of the victims, 82.4%, were male, aged between 14 and 36 years (61.8%). The vast majority of the victims (91.2%) reported having some religious belief; regarding the marital status, 45.6% of the patients were living with a partner, with no changes reported in the marital status after the trauma. Of the 68 patients, 39 (57.4%) had returned to their previous occupation when the quality of life of the victims was evaluated. With regard to schooling, there was a balance in the distribution of the victims among the different categories, however, it is noteworthy that the majority (54.4%) had only attended elementary education.

**Table 1** - Victims evaluated with the SF-36 according to socio-demographic characteristics - São Paulo, 2006-2007

Characteristics	N	%
<b>Gender</b>		
Female	12	17.6
Male	56	82.4
<b>Age (in years)</b>		
>14 ≤ 36	42	61.8
>36 ≤ 51	16	23.5
>51 ≤ 60	6	8.8
>60	4	5.9
<b>Religious belief</b>		
Yes	62	91.2
No	6	8.8
<b>Marital status</b>		
Lives with partner	31	45.6
Single/without partner	37	54.4
<b>Returned to the occupation prior to the trauma</b>		
Yes	39	57.4
No	29	42.6
<b>Schooling (in years)</b>		
≤ 4 years	18	26.5
5 to 8 years	19	27.9
9 to 11 years	18	26.5
> 11 years	13	19.1

Note: (n=68)

Table 2 summarizes the results of the application of the SF-36 questionnaire that was used in the second data collection stage of this study, i.e. between 3 and 6 months after the trauma.

**Table 2** - Descriptive measures of the values obtained for each domain of the SF-36 questionnaire - São Paulo, 2006-2007

Domains	Mean (SD)	Variation	Median
Functional Capacity	75.2 (± 32.6)	0 – 100	90.0
Physical Activity Limitations	58.9 (± 43.9)	0 – 100	75.0
Pain	75.3 (± 24.3)	20 – 100	74.0
General Health Status	86.0 (± 13.3)	45 – 100	89.5
Vitality	73.6 (± 14.26)	45 – 100	75.0
Social Aspects	80.3 (± 23.9)	0 – 100	87.5
Emotional Aspects	78.9 (± 36.4)	0 – 100	100
Mental Health	75.4 (± 15.9)	28 – 100	76.0

Note: (n=68)

From the descriptive measurements related to the SF-36 domains, presented in Table 2, it can be seen that the lowest mean value (58.9) and greater variability of results (SD = 43.9) were observed in the Physical Activity Limitations domain. The variability of the score in the analyzed group was also high in the Emotional Aspects (SD = 36.4) and Functional Capacity (SD = 32.6) domains, however, it was observed that half of the victims reached maximum or near to maximum scores in these domains (median = 90.0 and 100, respectively). The domain that achieved the highest mean score was the General Health Status (86.0) domain, followed by the Social Aspects (80.3) domain. The Functional Capacity, Pain, Vitality, Emotional

Aspects and Mental Health domains presented mean scores of around 75. Between 3 and 6 months after the trauma, when asked about their health compared to the period prior to the trauma, 53% of the respondents con-

sidered themselves to be in the same health condition as they were before the accident and 29.4% reported being worse than before. A better current health condition was reported by 12 patients (17.6% of the individuals).

**Table 3** - Descriptive statistics and comparison test between the short and long duration PTA\* groups for the SF-36 domains - São Paulo, 2006-2007

Domains	Short duration			Long duration			P
	N	Mean (SD)	Median	N	Mean (SD)	Median	
Functional Capacity	24	83.75 (30.30)	100.00	44	70.57 (33.28)	85.00	<b>0.020*</b>
Physical Activity Limitations	24	77.08 (38.25)	100.00	44	47.73 (43.74)	37.50	<b>0.004*</b>
Pain	24	81.96 (20.76)	92.00	44	71.66 (26.92)	72.00	0.154*
General Health Status	24	89.17 (11.73)	92.00	44	84.32 (13.87)	87.00	0.128*
Vitality	24	77.50 (14.14)	80.00	44	71.48 (14.04)	75.00	0.097§
Social Aspects	24	92.19 (12.67)	100.00	44	73.86 (26.11)	81.25	<b>0.003*</b>
Emotional Aspects	24	88.88 (27.22)	100.00	44	73.48 (39.76)	100.00	0.083*
Mental Health	24	79.17 (14.05)	80.00	44	73.27 (16.68)	74.00	0.147§

\* PTA duration excluding coma period; ¥ comparison test between groups according to Mann-Whitney test (data without normal distribution); § comparison test between groups according to Student's t-test (data with normal distribution)

Table 3 shows that there were statistically significant differences between the short and long duration PTA groups for the domains: Functional Capacity, Physical Activity Limitations and Social Aspects ( $p < 0.05$ ).

**Table 4** - Pearson's correlation coefficient for the SF-36 domains and the durations of PTA including or not the coma period - São Paulo, 2007

Domain	PTA in days from the date of the trauma		PTA in days from the BMR score of 6	
	Pearson's Correlation	P	Pearson's Correlation	P
Functional Capacity	-0,402**	0,001	-0,445**	<0,001
Physical Activity Limitations	-0,422**	<0,001	-0,437**	<0,001
Pain	-0,187	0,126	-0,256*	0,035
General Health Status	-0,107	0,387	-0,051	0,682
Vitality	-0,222	0,069	-0,184	0,133
Social Aspects	-0,410**	0,001	-0,450**	<0,001
Emotional Aspects	-0,240*	0,049	-0,320**	0,008
Mental Health	-0,207	0,091	-0,202	0,098

\*\*Correlation significant to the level of 0.01; \*Correlation significant to the level of 0.05

Table 4 presents the Pearson's correlation coefficients between the scores of the SF-36 domains and the duration of amnesia (from the day of the trauma and from the Best Motor Response score of 6 in the GCS). It was observed that the coefficients of all the domains were negative, i.e. for the two methods, as the duration of the PTA increased, the score obtained by the victims in the SF-36 evaluation decreased. In the comparative analysis of the Pearson's correlation coefficients for the SF-36 domains and the PTA durations, including or not the period of coma, similar values were noted, however, regarding those

in which the level of significance was reached, a slightly stronger correlation was observed in the results that analyzed the duration of PTA excluding the period of the coma. Furthermore, in the Pain domain, the correlation only reached significance when the period of coma was excluded from calculating the PTA duration. As mentioned in the method of this study, in the analysis presented in Table 3, the period of coma was excluded when categorizing the PTA as short or long term, considering that there was a greater magnitude of correlation between duration of PTA and QoL using this form of measurement.



## DISCUSSION

The comparison of the quality of life of victims who had long and short duration PTA was proposed in this study considering two important perspectives that pervade the knowledge about TBI and its consequences. The first indicates that the duration of the PTA is an important indicator of the severity of the CTBI, short duration PTA, time  $\leq 24$  hours, is indicative of mild/moderate trauma and long duration ( $>24$  hours) severe trauma<sup>(1)</sup>. Furthermore, the duration of the PTA has repeatedly proven the best single indicator to predict problems in cognitive functions or activities of daily living<sup>(1)</sup>. Therefore, knowing the duration of the PTA and its implications after the CTBI is of considerable clinical importance, as this helps in the planning and evaluation of rehabilitation programs and allows additional information to be provided to the family and patient regarding the post-trauma recovery. Another perspective suggests that the TBI affects the individual in the physical, cognitive and behavioral sphere, indicating the relevance of the evaluation of the QoL in the clinical monitoring of patients with this type of injury<sup>(4,6)</sup>.

Quality of life is a multidimensional concept that includes different domains, such as physical, psychological and social functions<sup>(12)</sup>. Moreover, it is an essentially subjective measurement and can be influenced by personal, cultural, religious and social characteristics<sup>(13)</sup>. In this sense, it is worth highlighting the low educational level of the sample, the fact that almost all of the individuals were aged  $\leq 60$  years (94.1%) and held some religious belief (91.2%), the male predominance (82.4%) and the return to the previous occupation by 57.4% of the participants. In the national literature, two studies using the WHOQOL-BREF to evaluate quality of life in TBI victims, showed an association between the outcomes and the sociodemographic variables of the victims. In one of these<sup>(14)</sup> the lowest values in the physical domain were associated with females and those of older age, in the other<sup>(15)</sup>, moderate correlations, though significant, were observed between overall quality of life and educational level ( $p \leq 0.05$ ) and return to work or study ( $p \leq 0.01$ ).

The return to the occupation prior to the injury represents one of the aspects that contribute more decisively to the quality of life of the TBI victim. In a way, it is the basis for full social reintegration, as it plays a key role in personal satisfaction and self-esteem, as well as being a fundamental element in the acquisition and maintenance of social relationships. The inability of the individual to return to work is directly related to the social aspects of the individual's life, affecting their self-image and sense of inferiority within society<sup>(4,16-17)</sup>. The vast majority of the victims (91.2%) reported some religious belief and some of them reported greater religiosity after the trauma, due to a feeling of gratitude for being alive and for not having had worse post-trauma outcomes. A literature review on the quality of life of TBI victims indicates that qualita-

tive studies also reported this feeling among some of their participants<sup>(17)</sup>. In the analysis of the marital status of the study participants, it was observed that 45.6% lived with a partner before the CTBI and continued to reside with them after the traumatic event. Although the literature has shown a high incidence of divorce and low occurrence of marriages after TBI<sup>(17)</sup> this result was not verified, perhaps because the period of 6 months is still too early to observe these consequences.

The mean scores of the domains displayed in Table 2 were compared with Brazilian studies<sup>(18-19)</sup> that presented results of the SF-36 with groups of normal subjects<sup>(18)</sup> and nonsmoking university students<sup>(19)</sup>. Comparing the means of the domains, higher values were noted in these groups in two domains, Functional Capacity and Physical Activity Limitation. Regarding the other domains, the mean values observed in the current study were very close to those found in these studies. The evaluation of the quality of life of TBI victims in the city of Ribeirão Preto<sup>(14)</sup>, six months post-trauma, showed the negative impact of the trauma in these victims. In this study the WHOQOL-BREF was the instrument used and the results also showed differences among the quality of life domains that were impacted by the TBI. The physical domain was the most affected, the scores of the psychological and environmental domains were also dissimilar to the general population, however, the social relationships domain was not significantly different in relation to normal standards.

Studies performed in other countries that applied the SF-36 with TBI victims and compared the results with groups of individuals of the general population (without specific diseases) showed lower means in groups of TBI victims in all eight domains of the instrument<sup>(17)</sup>. The selectivity of the affected domains, presented in the Brazilian studies is probably related to social, religious, and cultural characteristics and may indicate priorities in the organization and rehabilitation of TBI victims and the assistance provided for their inclusion the community.

Comparing the quality of life of victims who had long and short duration PTA, it was concluded that victims with APT  $>24$  hours (long duration) presented significant difference in the Functional Capacity, Physical Activity Limitation and Social Aspects domains regarding the results of the assessment of quality of life between three and six months after the CTBI. In these three domains, the group that presented long duration PTA showed more unfavorable results than the group of short duration. This result is consistent with studies that indicate that the longer the period of PTA, the worse the consequences of the CTBI for the victim and also reaffirms the importance of the Functional Capacity and Physical Activity Limitations domains in the recovery of individuals with TBI. These victims have impairment in these domains that is accentuated with the severity of this type of injury.

The results in Table 3 show that the Physical Activity Limitation domain presented the greatest difference between the mean values of the two groups. This domain evaluates the limitations in relation to the type and amount of work, as well as how these limitations make it difficult to carry out work and activities of daily living<sup>(10)</sup> and is probably related to the productivity of the victim after the trauma in this study: 45.4% of the patients with long duration PTA returned to the occupation prior to the trauma, while this percentage was 79.2% in the victims with short duration PTA. The Social Aspects domain seems not to have been affected in the TBI victims in general, however, differed in those with severe traumas. The reduction of social contacts after the trauma in the victims of serious TBI is a frequent and undesirable event<sup>(20)</sup>, since relatives, friends and neighbors can provide important social and emotional support for these victims.

The answers to question 2 of the SF-36 showed that in the majority of the cases (70.6%) the comparison of the health status before and after CTBI resulted in the indication by the victims of similarity or improvement in the health status after this event. Although the literature emphasizes the impairments resulting from the TBI, some studies describe gains resulting from this event that should not be overlooked, such as behavior that denotes new internal personal strengths, appreciation of the simple things in life, and the disruption of the self-destructive abusive use of drugs<sup>(17)</sup>. Therefore, in the post-CTBI rehabilitation process it is important to remember that the adaptability of both patients and their families is individual and depends on personal factors, as well as social and cultural ones.

The estimation of the duration of the PTA inevitably depends on the criterion used to define it. In this sense, it becomes problematic to compare different in-

vestigations since a large number of articles in the literature do not clearly specify the criteria used for this measurement and whether the PTA has been estimated from the date of the trauma or from the termination of coma<sup>(7-8)</sup>. Furthermore, in the clinical practice this measure should be objective and standardized, considering its usefulness to estimate the severity of the CTBI and to predict the cognitive and functional recovery of the patient. Regarding the controversy in the operational concept of this measurement, the relationship between the results of the SF-36 and duration of the PTA, including or not the period of coma, was verified in this study. Significant correlations were observed with both methods in the analysis of the following domains: Functional Capacity, Physical Activity Limitations, Social Aspects and Emotional Aspects. In these four domains the correlation coefficients were slightly higher when the measurement was performed excluding the coma period from the duration of the PTA, furthermore, the Pain domain was significant in the correlation only when this form of measurement of the duration of the PTA was used. These results indicate that the measurement of the duration of PTA, as a subsidy for the process of rehabilitation and recovery of patients with CTBI, should exclude the coma period.

Little has been discussed in the literature regarding this difference in measuring the PTA, however, researchers from Glasgow University, in 1993, showed results that indicated that the duration of the PTA can be calculated considering or not the coma period. The authors showed that there was a similar significant correlation between brain injuries diagnosed by MRI and duration of PTA with and without the coma period<sup>(21)</sup>. The results of the two studies differ and indicate the need for further research leading to unanimity in how to measure the duration of PTA after the traumatic event.

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This study was funded by the State of São Paulo Research Foundation (FAPESP). Processo 06/58200-1.