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Time to follow commands remains the most useful injury severity variable for predicting WeeFIM® scores 1 year after paediatric TBI

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Abstract

Objective—To investigate the relationship between injury severity variables, particularly time to follow commands (TFC) and long-term functional outcomes in paediatric traumatic brain injury (TBI).

Methods and procedure—Participants included 40 children with moderate-to-severe TBI discharged from inpatient rehabilitation. Measures of severity were initial Glasgow Coma Scale score, TFC, duration of Post Traumatic Amnesia (PTA) and total duration of impaired consciousness (TFC + PTA). Functional outcome was measured by age-corrected Functional Independence Measure for Children (WeeFIM®) scores at 1-year after discharge.

Results—Correlations indicated that injury severity variables (TFC, PTA and TFC + PTA) were all associated with functional outcome. Regression analyses revealed that TFC and TFC + PTA similarly accounted for 49% or 47% of the variance, respectively, in total WeeFIM® score. Thirty-seven of 40 children had good outcome; of the three children with TFC 426 days, two had poor outcome.

Conclusion—PTA and TFC + PTA do not provide a benefit over TFC alone for prediction of long-term outcome and TFC is identified earlier in the recovery course. TFC remains an important predictor of functional outcome 1-year after discharge from inpatient rehabilitation after paediatric TBI.

Keywords

Child; coma; outcome; PTA; traumatic brain injury

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Introduction

Accurate prediction of functional outcomes after moderate-to-severe paediatric traumatic brain injury (TBI) allows for greater care co-ordination and planning across multiple domains, including long-term treatment, outpatient therapy, education, community access and family adjustment. Even within the sub-set of children with TBI who require inpatient rehabilitation, outcomes vary widely [1, 2]. While initial injury severity, as measured by the Glasgow Coma Scale (GCS), has some utility in predicting outcome [3–5], for children in inpatient rehabilitation, functional recovery early in the rehabilitation course has emerged as an important predictor of later functional outcome [1, 6].

Variables indicating duration of impaired consciousness, such as time to follow commands (TFC) and length of post-traumatic amnesia (PTA), describe the trajectory of an individual's recovery and have been found to be useful for predicting functional outcome [2, 7, 8]. TFC is typically defined as the duration of time between injury and the ability to follow simple motor commands [9], whereas PTA is defined as the time characterized by the inability to store and recall new information [10]. Although the end of PTA is consistently defined as the creation of new memories, the start time of PTA can be assigned as either the time of injury or the time when commands are followed. When post-traumatic amnesia is measured with a start time of when commands are followed, then TFC + PTA represents the total duration of time from injury to when the individual consistently lays down new memories. This manuscript defines PTA as beginning at the time of resolution of TFC and TFC PTA will be used to refer to the total duration of time between injury and resolution of PTA.

Recent studies have focused on TFC + PTA as one of the most powerful single predictors of short- and long-term outcome after TBI. In adults, TFC + PTA has been found to correlate with [11] and to predict [12] functional outcome, as measured by the Functional Independence Measure (FIM®) [13], at discharge from inpatient rehabilitation. Likewise, work from the adult TBI Model Systems data shows that there exist threshold values of TFC + PTA which are useful for predicting FIM® scores, employment and independent living 1-year post-injury [14] as well as global functional outcome, as measured by the Glasgow Outcome Scale (GOS), at 1 and 2 years post-injury [15].

Similarly, in children, TFC + PTA has been associated with short- and long-term outcomes after TBI. TFC + PTA has been shown to predict functional outcome at discharge from hospitalization using the Functional Independence Measure for Children (WeeFIM®) [2, 16] or the GOS [17]. With regard to longer-term outcomes in children, TFC + PTA has been shown to predict neuropsychological performance 1-year post-injury [18] and GOS score 1 and 2 years post-injury [17].

A small number of studies have examined the relative predictive value of TFC alone compared to TFC + PTA. Some studies have reported that TFC + PTA is a better predictor TFC: Brown et al. than [19] identified a slight advantage of TFC + PTA in predicting FIM® and Disability Rating Scale (DRS) scores at discharge from rehabilitation and 1-year follow-up in adults. Katz and Alexander [8] found that TFC + PTA was better than TFC alone for

predicting GOS scores 6 and 12 months post-injury in a combined sample of children and adults. McDonald et al. [18] found TFC + PTA to be superior for predicting neuropsychological performance early in recovery at 1-year post-injury. Recently, Eastvold et al. [20] considered both TFC and TFC + PTA in their examination of predictors of independent living status and return to work 1-year post-injury among adults with TBI who received care in Veterans Affairs Medical Centre inpatient rehabilitation programmes. They found no added benefit of TFC above and beyond that of TFC + PTA; of note, they used TFC + PTA as their predictor to capture the largest sample size possible as they were missing data for TFC alone. This finding highlighted that TFC alone may not be consistently measured or reported, which then can limit its role in research comparison.

In children, Ruijs et al. [21] previously reported that TFC demonstrated stronger correlations with outcome (GOS) than TFC + PTA at 3 months, 1 year and 2 years post-injury. In addition, TFC was felt to be easier to assess than TFC + PTA, thereby further contributing to the utility of TFC alone as a predictor variable. Similarly, Suskauer et al. [2] reported no additive benefit of PTA above and beyond TFC for predicting WeeFIM® scores in early stages of recovery. Compared to PTA and TFC + PTA, TFC alone had the highest correlations with WeeFIM® scores and was a better predictor of functional outcome for children with TBI at both discharge from inpatient rehabilitation and 3-month follow-up [2, 6]. Threshold values for TFC with relevance for outcome were identified: children with TFC greater than 26 days consistently fell into the category of poor functional outcome at the time of discharge.

While TFC alone has been demonstrated to be useful in predicting short-term functional outcomes after paediatric TBI, it remains unclear whether TFC alone remains useful as a predictor of longer-term functional outcome from paediatric TBI. Given the recent reports of the utility of TFC + PTA for predicting outcomes 1-year post-injury in adults, the authors were particularly interested in examining whether or not TFC continues to be the measure of severity with the strongest association with functional outcomes 1-year after injury in children.

The purpose of this study was to evaluate the utility of TFC, in the context of other injury severity variables, in predicting functional outcomes after paediatric TBI as measured by WeeFIM® score at 1-year follow-up from discharge from inpatient rehabilitation. It was hypothesized that TFC would remain the best predictor when compared to initial GCS score, duration of PTA and total duration of impaired consciousness (TFC + PTA). It was also hypothe sized that the previously identified cut-off value of 26 days for TFC would remain clinically useful for predicting poorer outcome at 1 year from paediatric TBI.

Methods

Participants

Data were collected from 40 children with TBI discharged from a tertiary care affiliated acute brain injury rehabilitation unit between September 2004 and January 2012. All children had moderate or severe TBI, defined as first available Glasgow Coma Scale score of less than or equal to 12 or the presence of intracranial trauma-related neuroimaging

findings. Children with 1 year post-discharge follow-up data were included in the primary analyses; demographic information from children without 1 year follow-up data was used for the purpose of comparing the children with and without follow-up data to detect potential sample bias. Only children who were admitted directly from initial acute care hospitalization and for whom TBI was the primary reason for inpatient rehabilitation were included. Children were excluded from the analysis if they were too young for administration of the Children's Orientation and Amnesia Test (less than 3 years old at injury) or older than 18 years at the time of injury. Children with pre-existing learning disorders warranting an IEP or psychiatric diagnosis such as attention deficit, depression or anxiety were not excluded; for these children, a review of medical records detailing pre-injury function was assessed to determine if pre-injury WeeFIM® scores would have been age-appropriate.

Measures

Glasgow Coma Scale (GCS)—GCS is defined as the earliest available GCS score [22] documented in available medical records, whether from the scene of the injury, in transit or upon arrival to the emergency department. GCS scores were obtained as part of routine clinical care and were collected for the study through medical record review. For the two cases where GCS was not reported in the available medical records, early GCS scores were estimated based on clinical documentation. Severe TBI was defined as an initial GCS score of 3–8, whereas a moderate TBI was defined as an initial GCS score of 9–12 or 13–15 with intracranial abnormalities identified on neuroimaging.

Time to follow commands (TFC)—TFC was defined as the ability to follow verbal commands twice in a 24-hour period. When TFC occurred after admission to the rehabilitation unit, staff report and documentation were used to determine TFC. When TFC occurred prior to admission to the inpatient unit, this data point was obtained based on medical record review; if not documented in the available medical records, then parent report was used.

Duration of posttraumatic amnesia (PTA)—PTA was defined as the time from TFC until two consecutive scores within two standard deviations of the mean for age were obtained on the appropriate instrument. For most children, PTA was assessed with the Children's Orientation and Amnesia Test (COAT [7]). For older children (16–18 years), an adult measure of PTA was used: the Galveston Orientation and Amnesia Test (GOAT [23]), Memory Orientation and Attention Test (MOAT [24]) or Orientation Log (O-log [25]). As part of clinical care, the age-appropriate measure was administered once daily by neuropsychology staff on weekdays until children met the above criteria for emergence from PTA. There were six children who were felt to have emerged from PTA at the time of first evaluation on the inpatient rehabilitation unit; for these children medical record review and child and parent report were used to provide the best clinical estimate for emergence from PTA. For two cases, PTA had not resolved at the time of discharge from inpatient rehabilitation, and a definitive date of emergence from PTA could not be determined based on post-discharge record review. For these cases, the time from TFC to discharge from

inpatient rehabilitation was used as a surrogate for PTA (e.g. 54 days and 107 days), reflecting that PTA was *at least* as long as the number used in the analysis.

Total duration of impaired consciousness (TFC + PTA)—TFC + PTA was defined as the sum of the durations of TFC and PTA.

Functional outcomes

Outcome was measured using the Functional Independence Measure for Children (WeeFIM® [16]). The WeeFIM® is an 18-item performance-based instrument that assesses mobility, self-care and cognitive abilities and provides a total score as well as Mobility, Self-Care and Cognitive sub-scale scores. It has been validated in children with normal development [26], developmental disabilities [27, 28] and acquired brain injury [1, 28]. WeeFIM® Developmental Functional Quotients (DFQs) were used to provide a standard score of 'age appropriate' functioning in order to allow comparison across age groups. Each WeeFIM® item is rated on a scale from 1–7 and DFQs can range from 14 (if a child receives a score of 1 on an item for which the age-based norm is 7) to greater than 100 (if a child's performance exceeds age-based expectations). Consistent with Suskauer et al. [2], total WeeFIM® DFQ greater than or equal to 85 was considered a 'good' outcome, DFQ between 70–84 was considered a 'moderate' outcome and DFQ less than 70 was considered a 'poor' outcome. Discharge WeeFIM® ratings were obtained by each child's primary therapist just prior to the child's discharge from inpatient rehabilitation. Follow-up WeeFIM® ratings were obtained from parents as part of hospital protocol by a private company with trained interviewers using a standardized phone protocol 12 months following the child's discharge from inpatient rehabilitation.

Procedure

All data were collected as part of routine clinical care and entered into a programme evaluation database. The Johns Hopkins University School of Medicine's Institutional Review Board granted approval approval for a separate research database to be created for the study that was stripped of all patient identifiers and protected health information. The IRB approval also granted access to medical records. A brief clinical record review was conducted to locate clinical data not entered into the database.

Statistical methods

All statistical analyses were completed using SPSS 19.0 (www.spss.com) and alpha was set at $p<0.05$ for all analyses. Descriptive statistics were calculated to examine demographic variables, injury severity and outcomes. Characteristics of children with and without 1 year follow-up were examined via T-tests to detect sample bias. Bivariate correlation analyses were used to investigate relationships between injury severity variables (GCS, TFC, PTA and TFC + PTA) and follow-up WeeFIM® variables (Self-Care DFQ, Mobility DFQ, Cognitive DFQ and Total DFQ). Strength of correlations, based on correlation coefficient, was assigned using the following parameters: $r = 0.2–0.5$ (small), $r = 0.5–0.8$ (moderate), $r>40.8$ (strong) [29, 30].

Hierarchical multiple linear regressions were performed to explore the relationship between the predictor variables and each of the WeeFIM® domain scores. Predictor variables for the first set of regressions included GCS, TFC and PTA. Predictor variables were entered in temporal order, with GCS entered into each model first, followed by TFC and then PTA. The predictor variables were included regardless of the correlation results to allow for replication of the analyses of the prior study by Suskauer et al. [2]. The change in variance at each step was evaluated to examine the additional contribution of each variable into the model. A second set of hierarchical multiple linear regressions was performed to examine the predictive power of GCS and TFC + PTA on WeeFIM® scores. Predictive variables were again entered in temporal order, with GCS followed by TFC + PTA. The additive predictive power of TFC + PTA was then examined. Given that the number of predictive variables differed between the two sets of regression models and that a larger number of independent predictor variables can inflate R^2, adjusted R^2 was used to evaluate the relative predictive power of the two sets of regression models. Collinearity statistics were evaluated for each model; tolerance <0.10 was used to determine if multicollinearity affected the analyses [31, 32].

The clinical relevance of previously identified cut-off points for TFC according to Suskauer et al. [2] for identifying outcomes was explored by examining the distribution of good, moderate and poor outcome based on TFC.

Results

Description of the sample

Demographic characteristics of the study sample are presented in Table I. The 40 children with 1-year follow-up data ranged from 4–18 years of age at the time of injury. Twenty were boys (50%) and 32 were Caucasian (80%). Ten participants (25%) had pre-injury difficulties warranting diagnosis (e.g. learning difficulties or psychiatric illness). A review of medical records detailing pre-injury function determined that pre-injury WeeFIM® scores would have been age-appropriate for these children. Four children had initial GCS between 13–15; all of these children had documented neuroimaging findings. Age was not significantly correlated with any of the injury severity variables. Based on initial GCS scores, 82.5% (n = 33) of children had a severe TBI.

The average length of stay was 33 days (SD = 34 days). Follow-up data were collected an average of 11.5 months following discharge (SD = 26 days), with the earliest collection 8.9 months post-discharge and the latest collection 13.5 months post-discharge. Skew was acceptable (<3) for measures of injury severity and duration of impaired consciousness [33]. Three of the WeeFIM® DFQs had skew greater than three: Self Care, Mobility and Total DFQ. Review of the distribution indicated two outliers that demonstrated the poorest outcome in WeeFIM® scores at 1-year follow-up. However, these poor outcomes were consistent with the severe nature of the children's injury as reflected in their extended impairments in consciousness (88 and 142 days). The two cases were retained in analysis as part of the varied range in outcomes associated with paediatric brain injury.

The 40 children in the current sample represent 46% of the patients eligible for 1-year follow-up data due to discharge beginning in September 2004. The follow-up rate for this study is consistent with other paediatric rehabilitation studies utilizing the WeeFIM® at 1-year follow-up (range from 23– 65%) [34, 35] as well as adult TBI 1-year follow-up (38–52%) [36, 37]. Barriers for those without follow-up data included phone disconnection (44%), no answer (33%), wrong number (17%) and refusal (6%).

Of the children without follow-up data, 33 were boys (70%) and 26 were Caucasian (55%). The groups of children with (n = 40) and without (n = 47) follow-up data did not differ in discharge Total WeeFIM® DFQ or age at injury (p40.05). A greater proportion of children with follow-up data were Caucasian than children without follow-up data (p>0.05). The children without follow-up data had a significantly greater proportion of males ($p < 0.05$). Length of stay differed between the children with and without follow-up data (p=0.05); however, after removal of an outlier (LOS = 254 days) from the group without 1 year follow-up data, no between-group difference persisted (p>0.05). Four children (8.5%) from the group without 1 year follow-up data remained in PTA at time of discharge, compared to two children from the current sample.

Correlations between injury severity variables and WeeFIM® outcomes

Results of bivariate correlation analyses examining the relationship between injury severity variables and WeeFIM® outcomes are presented in Table II. GCS was not significantly correlated with any of the WeeFIM® outcomes. TFC, PTA and TFC + PTA were significantly correlated with WeeFIM® DFQs; all correlations were of moderate strength, except for the correlation between Cognitive DFQ and PTA, which was small. The inclusion of the two outliers with low WeeFIM score at follow-up positively affected the correlation results by extending the range and variability of WeeFIM® scores; exclusion of the outliers resulted in small correlations between only Self-Care DFQ and TFC, PTA and TFC + PTA.

Hierarchical regression models

The results of the hierarchical multiple linear regression analyses predicting each of the WeeFIM® domain and Total WeeFIM® DFQs at 1-year follow-up are presented in Table III. Analyses of collinearity revealed tolerances of 0.3.

For all models examining the separate contributions of TFC and PTA, TFC significantly contributed to the overall predictive power of the model, whereas PTA did not add any predictive power above and beyond TFC for any DFQ. Comparison of adjusted R^2 values indicated that the models that included TFC and PTA as separate variables explained the same or more variance than models in which TFC + PTA was examined as a single variable.

Evaluation of TFC values with clinical relevance for predicting functional outcome

Previous findings using ranges of TFC as a predictor of good, moderate and poor WeeFIM® outcomes indicated that a TFC of greater than 26 days was more likely to be associated with poor outcome at discharge [2]. Using the previously established threshold, TFC scores were compared to WeeFIM® outcomes at discharge and then 1-year follow-up. At discharge those with TFC less than 26 days were spread evenly across outcome levels (good, moderate

and poor), but, by 1-year follow-up all of these children (n = 37) were in the good outcome category. In contrast, the children with TFC greater than 26 days were outliers with extended PTA times. All three were in the poor outcome category at discharge and two of the three children with TFC greater than 26 days remained in the poor outcome category at 1-year follow-up.

Discussion

The purpose of this study was to investigate the utility of TFC as compared to other measures of severity (specifically PTA and TFC + PTA) for predicting functional outcome for children with moderate-to-severe TBI at 1-year follow-up from inpatient rehabilitation services. Although TFC + PTA has been reported to be the best injury severity indicator for adult long-term follow-up [11, 12, 14, 15, 20], the paediatric literature has been less consistent [8, 18, 19]. Previous paediatric studies have found that TFC was a better predictor of WeeFIM® scores 3 months post-discharge [2] and that TFC demonstrated stronger correlations with outcome (GOS) than TFC + PTA at 3 months, 1 year and 2 years post-injury [21]. It was hypothesized that TFC would remain the best predictor of longer term functional outcome, as measured by WeeFIM® scores at 1 year post-discharge.

This study found that TFC, PTA and TFC + PTA were all significantly correlated with WeeFIM® scores 1 year after discharge from inpatient rehabilitation. It replicated previous findings that GCS, one of the earliest injury severity variables, does not significantly predict long-term functional outcomes in paediatric TBI [1, 2, 6]. Regression analysis indicated that both TFC and TFC + PTA accounted for 25–40% of the variance in predicting WeeFIM® Self-Care, Mobility, Cognitive and Total DFQs at 1-year follow-up. Hierarchical regression examining the individual contributions of TFC and PTA indicated that PTA did not add any predictive value above and beyond TFC. Thus, the predictive value of TFC + PTA appears to be driven by the information provided by TFC.

These findings replicate the earlier work of Ruijs et al. [21], who reported that TFC + PTA did not add value beyond TFC for examining short- and long-term outcomes after paediatric TBI. These results also support earlier work by Suskauer et al. [2] demonstrating that TFC alone was a better predictor of functional outcome for children with TBI at both discharge from inpatient rehabilitation and 3-month follow-up. Findings from Eastvold et al. [20] suggested that TFC alone and TFC + PTA may be equivalent in their predictive power, as TFC alone did not provide additional benefit to TFC + PTA. While TFC alone and TFC + PTA may be equally predictive of functional outcome, given that TFC alone is determined earlier in recovery than TFC + PTA, TFC alone may be more useful than TFC + PTA both PTA for acute and long-term treatment planning.

Suskauer et al. [2] previously indicated that TFC of less than 26 days predicted better outcomes at discharge from inpatient rehabilitation. That finding was replicated in the current study, with all children with TFC <26 days achieving long-term function consistent with a good outcome, as measured by the WeeFIM®, while two of three children with TFC >26 days had poor functional outcome at 1 year. No children in this cohort fell into the moderate outcome range at 1-year follow-up. This pattern of later recovery is consistent

with recent work demonstrating that, even amongst the most severely injured, children who demonstrate improvement in WeeFIM® scores in the first months of inpatient rehabilitation tend to continue to make functional progress after discharge from inpatient rehabilitation while a sub-set of children who do not demonstrate functional gains during rehabilitation are more likely to remain severely impaired at follow-up [6]. Therefore, the TFC cut-off of 26 days retained its usefulness in identifying those cases at risk of remaining in the poor category at 1-year follow-up.

The data emphasize the importance of capturing TFC which, at least from one report, appears to be a commonly missing data point [20]. Although TFC may occur during the acute care stay and may not be readily available upon a patient's admission to inpatient rehabilitation, the data suggest that TFC frequently can be obtained from review of acute care hospital records. While potentially less reliable than medical records, many family members can also provide useful information regarding the timing of milestones during a patient's recovery. Given the utility of TFC in predicting short- and long-term outcome, increased efforts to collect TFC data are recommended for both clinical and research purposes.

While this cohort demonstrated good variability in WeeFIM® scores at discharge from inpatient rehabilitation, there is a restricted range of WeeFIM® scores 1-year post-discharge, with almost all children functioning at an age-appropriate range of function on this measure at follow-up. The two outliers with poor recovery represent an important sub-population of children with persisting severe disabilities after TBI and their data heavily influenced the reported findings. The bimodal distribution of outcome in this cohort with very heavy weighting toward good outcome, reflects the bias of the WeeFIM® measure, which strongly emphasizes motor skills in assessing functional independence and burden of care. Compared to cognitive or behavioural problems, motor difficulties tend to be less severe and recover more rapidly in TBI [38–40]. The motor emphasis of the WeeFIM®, in contrast to other outcome measures, that emphasize cognitive and behavioural functioning may help explain some of the variation in prior findings regarding the relative utility of TFC in comparison to TFC + PTA. In particular, it may be that the additive nature of PTA in TFC + PTA is especially important for predicting outcomes more heavily emphasizing cognitive function, such as in the prior study in children examining neuropsychological performance [18].

Additional limitations of the current study include the small sample size, possibility for retrospective bias in reporters of TFC and PTA and potential bias of parent report in follow-up data. The children in the follow-up study were more likely to be Caucasian than in the comparison group, which limits conclusions that can be generalized to multiple ethnicities; this may also have implications for social economic status differences between the groups, although that was not directly studied. The sample only included children admitted to an inpatient rehabilitation facility, so therefore generalization to the larger population of children who experience moderate-to-severe TBI (including those who discharge from acute care to home) is limited. Similarly, the study focused on children with a restricted range of severity and did not include children with mild TBI.

The limitations of the current study suggest areas for future work. Replication of these findings in larger paediatric cohorts and using different outcome measures will be useful. In particular, use of an outcome measure that better captures a greater range in outcomes after paediatric TBI would be very helpful. One candidate outcome measure is the recently published Glasgow Outcome Scale-Extended Paediatric Version (GOS-E Peds) [41]. The GOS-E Peds captures important functional variables not captured by the WeeFIM®, such as whether or not the child functions at their pre-injury capacity in school and whether or not any injury-related factors continue to interfere with daily life, including with family relationships and friendships. It is anticipated that the GOS-E Peds will capture variability in cognitive and behavioural function that is not well captured on the WeeFIM® and, as such, will be able to discriminate within the population of children with good motor recovery after TBI. In addition, more nuanced measures of functional cognitive recovery should be explored in relation to injury severity predictors. Lastly, examination of the utility of TFC alone for predicting outcomes previously associated with TFC + PTA may be useful for refining the ability to predict long-term outcome as soon as possible after injury.

In conclusion, despite the recent emphasis on TFC + PTA for predicting outcome after TBI, there is evidence that supports that TFC alone has equal statistical power for predicting at least some functional outcomes in paediatric TBI. Given that TFC is determined earlier in the rehabilitation course than TFC + PTA, TFC is considered more useful than TFC + PTA in the setting where they similarly predict outcomes. TFC remains an important variable for use in clinical and research settings and should not be excluded in favour of TFC + PTA.

Acknowledgments

Declaration of interest

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Table I

Patient characteristics (n = 40).

Patient characteristic	Mean	Median	SD	Range
Age at injury (years)	12.5	13.6	4.5	4-18
Length of stay (days)	33.1	21.5	33.9	4-198
Initial GCS	6.4	6	3.5	3-15
TFC (days)	8.5	4.5	10.7	0-44
Duration of PTA (days)	19.0	12.5	20.5	0-107
TFC + PTA (days)	27.5	18.5	29.7	0-142
1-year follow-up Total Self Care DFQ	94.8	100.0	19.4	14-110
1-year follow-up Total Mobility DFQ	94.5	100.0	18.9	14-100
1-year follow-up Total Cognitive DFQ	94.1	100.0	15.5	29-117
1-year follow-up Total WeeFIM® DFQ	94.5	100.0	17.3	19-109

Table II

Bivariate correlations between injury severity variables and WeeFIM® scores (n = 40) at 1-year follow-up.

	GCS	TFC	PTA	TFC + PTA
Self-Care DFQ	0.24	–0.72***	–0.70***	–0.74***
Mobility DFQ	0.25	–0.68***	–0.65***	–0.69***
Cognitive DFQ	0.19	–0.56***	–0.48**	–0.53***
Total DFQ	0.24	–0.70***	–0.66***	–0.71***

*$p \leq 0.05$

**$p \leq 0.01$

***$p \leq 0.001$.

Table III

Hierarchical regression of injury severity variables and WeeFIM® DFQs (n = 40) at 1-year follow-up.

	Self-Care DFQ		Mobility DFQ		Cognitive DFQ		Total DFQ	
	ΔR^2	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**
Model 1								
GCS	0.06	–0.74	0.06	–0.05	0.04	–0.06	0.06	–0.07
TFC	0.47***	–0.49	0.40***	–0.46	0.28***	–0.52	0.44***	–0.52
PTA	0.04	–0.34	0.04	–0.30	0.00	–0.09	0.03	–0.28
	Overall Adj R^2 = 0.53		Overall Adj R^2 = 0.45		Overall Adj R^2 = 0.26		Overall Adj R^2 = 0.49	
Model 2								
GCS	0.06	–0.04	0.06	–0.01	0.04	–0.01	0.06	–0.03
TFC+PTA	0.49***	–0.76	0.42***	–0.70	0.25***	–0.53	0.45***	–0.72
	Overall Adj R^2 = 0.53		Overall Adj R^2 = 0.45		Overall Adj R^2 = 0.24		Overall Adj R^2 = 0.47	

*$p \leq 0.05$

**$p \leq 0.01$

***$p \leq 0.001$.