

Residential Rehab Length of Stay Post TBI – Key Contributing Factors

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Introduction

A common question when clients enter rehabilitation is:

“How long am I likely to stay?”

This regression analysis attempts to answer this question via reflection on past data with the criteria:

- Information known on day of admission to rehab
- With information relating to duration of post traumatic amnesia (PTA)



DO THESE MATCH WHAT WE FOUND AT ABI?

Previous work explored the following variables in relation to length of stay (LoS) in Rehab:

* On admission to Rehab

Variables	References		
	1	2	3
Gender	×	n/a	×
FIM Motor*	✓	✓	✓
FIM Cognitive*	✓	×	✓
LoS in hospital	✓	✓	✓
Age	×	✓	×
GCS	×	✓	✓
Neurological complications	✓	✓	✓
Non neurological complications	n/a	✓	×
Cause of injury	✓	×	×
Level of education	✓	n/a	×

PTA duration was not explored

n/a not investigated
✓ significant
× not significant

Method

- Brain storming:
 - What variables may contribute to LoS?
 - And of these do we have the information?
- Decision re method: multiple linear regression
- Set inclusion criteria for sample:
 - ✓ Clients with moderate to severe TBI
 - ✓ Discharged between 01/04/14 and 31/03/15
 - ✓ From Auckland & Wellington facilities
- Revision of sample & set exclusion criteria:
 - × LoS at ABI > 150 days
 - × Incomplete/missing data & outliers
 - × Clients who died or went back to hospital
 - × Still in PTA on time of discharge
- Decision on **2 regression models**

Based on known information on day of admission

Based on known information on day of admission + PTA duration

Results

Summary Output Tables:

R Square	60%
Observations	138
Coefficients P-value	
Intercept	73.833
Gender (m = 0, f = 1)	6.091 0.127
AKL/WGTN Region (out = 0, in = 1)	7.270 0.029
Westmead*	-2.000 0.002
FIM Motor*	-0.370 0.002
FIM Cognitive*	-0.190 0.707
FAM Total*	-0.237 0.384
DOM Total*	0.188 0.899
Age on Date of Injury	0.078 0.371
LoS in hospital	0.466 0.006

R Square	69%
Observations	138
Coefficients P-value	
Intercept	36.448
PTA duration	0.796 7E-09
Gender (m = 0, f = 1)	8.902 0.012
AKL/WGTN Region (out = 0, in = 1)	6.723 0.022
Westmead*	0.025 0.969
FIM Motor*	-0.249 0.022
FIM Cognitive*	-0.198 0.657
FAM Total*	-0.148 0.538
DOM Total*	0.281 0.830
Age on Date of Injury	0.022 0.776
LoS in hospital	-0.287 0.134

Example:

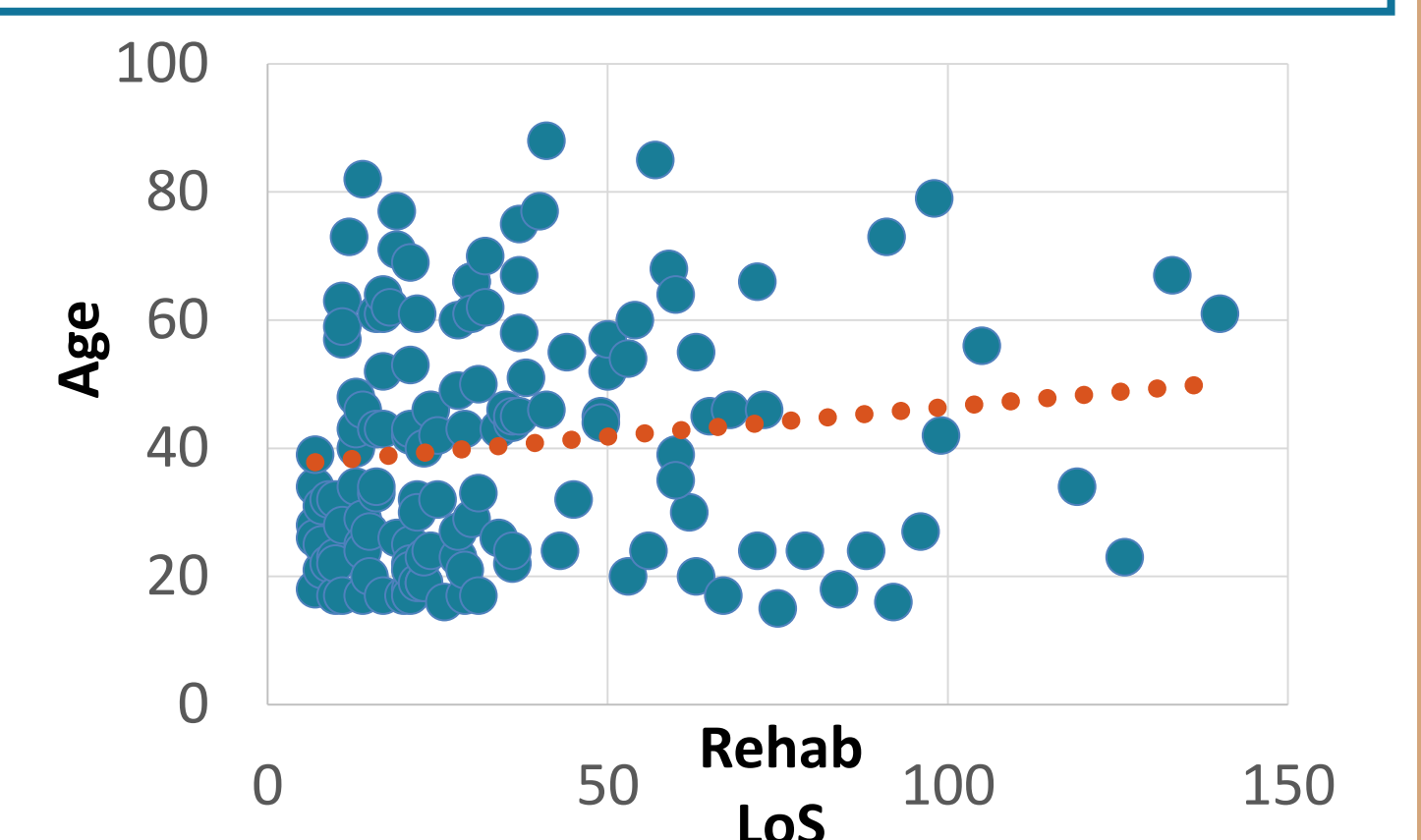
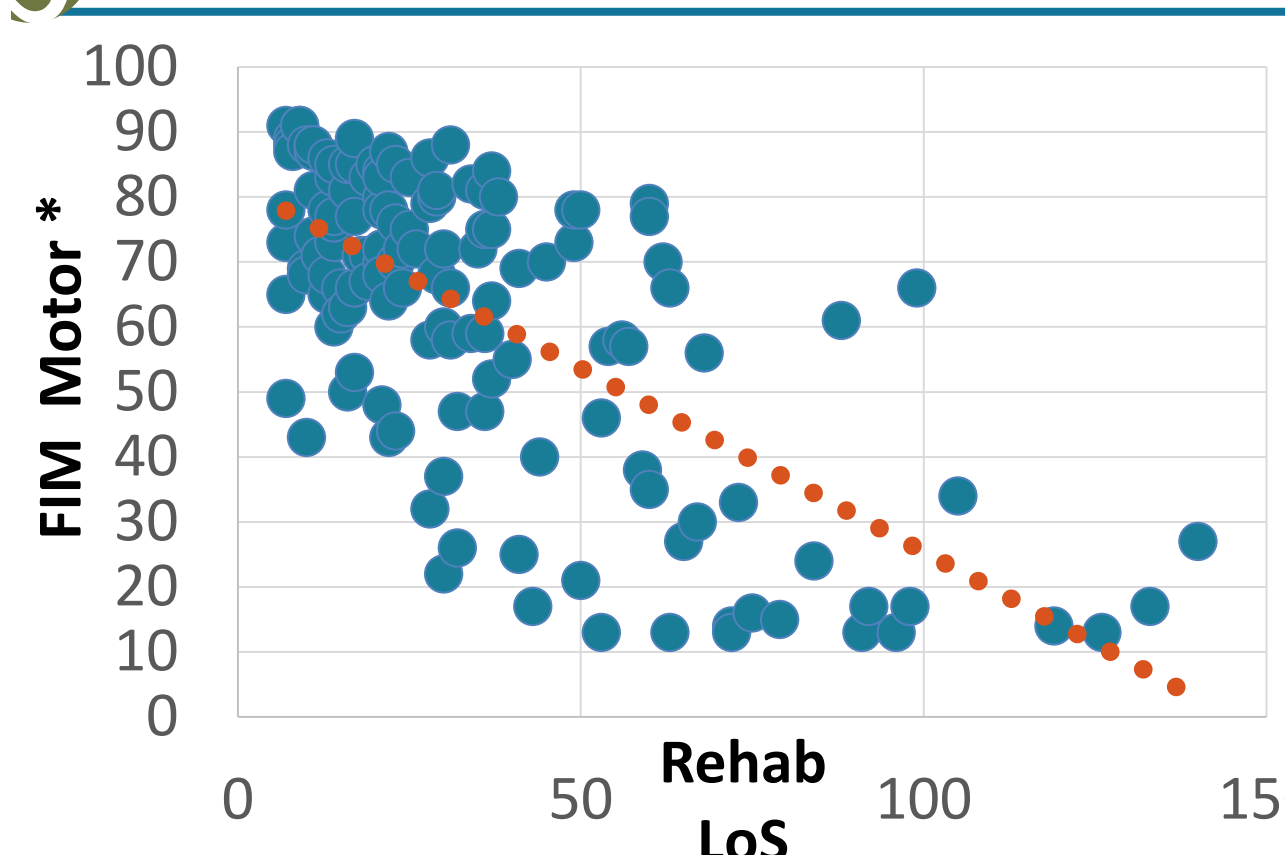
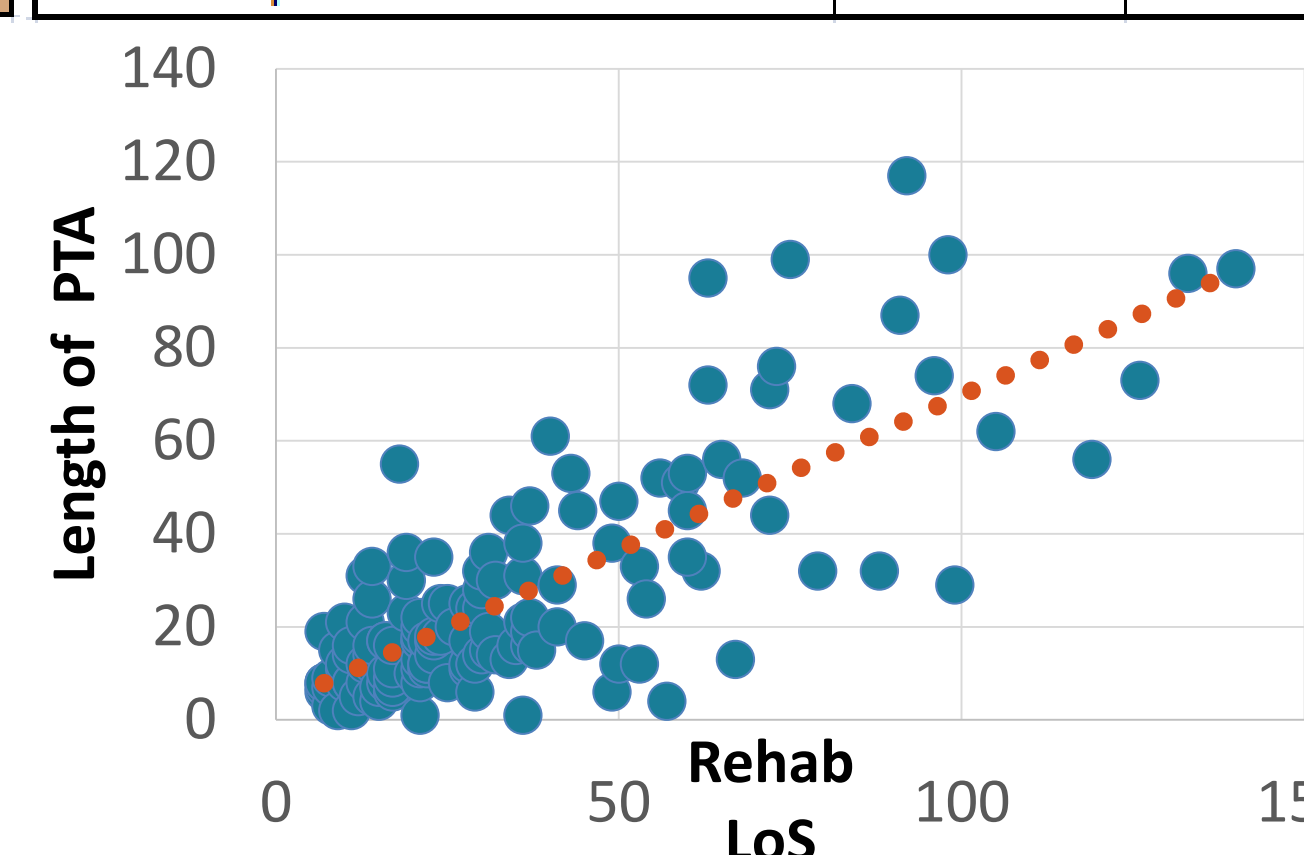
- 25 year old man from Rotorua
- Westmead* = 8
- FIM motor* = 50
- FIM cog* = 25
- FAM total* = 70
- DOM total* = 5
- LoS hospital = 12 days
- PTA duration = 20 days

Applying regression model to the example for the 2 scenarios would result in the following LoS:

a	73.8	-	n/a	+	0	+	0	-	16	-	18.5	-	4.8	-	17	+	0.9	+	2	+	6	=	27 days
b	36.5	+	15.9	+	0	+	0	+	0.2	-	12.5	-	5	-	10	+	1.4	+	1	-	3	=	24 days

Scatter plots of interest in relation to LoS in Rehab:

- Length of PTA: strong positive
- FIM Motor*: strong negative
- Age: weak positive



Discussion

ABI Rehabilitation's data suggests there are significant variables known at the point of admission that can assist with the question surrounding LoS. Interestingly we found age to not be one of them. Also consistent with previous studies FIM motor* and LoS in hospital played a significant role in determining LoS. When determining LoS within ABI Rehabilitation, at the point of admission, there is merit in factoring in the identified significant variables. However, given the heterogeneous nature of traumatic brain injury the authors recommend that an individualised approach is taken. PTA duration is strongly linked to LoS in rehab and once known this regression model is stronger. However, prior to knowing this, initial Westmead score is a significant variable. Further investigation into the significance of other variables including pre-injury education level, acute imaging findings, duration of impaired consciousness and secondary injuries may strengthen the model. In addition, further exploration into the significant finding of region within this study would be of interest.

References

- Arango-Lasprilla JC, Ketchum JM, Cifu D, et al. Predictors of extended rehabilitation length of stay after traumatic brain injury. Arch Phys Med Rehabil 2010;91:1495-504
 - Cowen TD, Meythaler JM, DeVivo MJ, et al. Influence of early variable in traumatic brain injury on Functional Independence Measure scores and rehabilitation length of stay charges. Arch Phys Med Rehabil 1995;76:797-803
 - Lebmkuhl LD, Hall KM, Mann N and Gordon High WM, Hall KM, Rosenthal M, et al. Factors affecting hospital length of stay after traumatic brain injury. J Head Trauma Rehabil 1996;11:85-96
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