The Berg Balance Scale Discriminates Household and Community Ambulation in Patients with Stroke: A Study of the Population Admitted to Post-Acute Care Programs in Taiwan.

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Ambulation After Stroke

- Community ambulation
- According to the study from Fulk et al,12 patients achieved ≥ 205 meters in 6-minute walk test (6MWT) were classified as community ambulators; participants who did not reach this distance were regarded as household ambulators

Objective

- To regain the ability of community ambulation is a meaningful goal for stroke patients.
- **The aim of this study** was to investigate whether some commonly used clinical parameters could be used as factors to predict community ambulation defined by the distance accomplished in 6MWT.

Methods

- **Subjects and Settings**
- This **retrospective cohort study** collected the data of patients who entered the Post-acute Care Cerebrovascular Diseases (PAC-CVD) program implemented by Taiwan National Health Insurance (TNHI) in Taichung Tzu Chi Hospital, Taiwan.

Methods - inclusion

- From October 2014 to March 2018
- (1) patients suffered from first-ever acute stroke less than one month,
- (2) under stable medical condition and with the functional level of Modified Rankin Scale (MRS) score of 2–4,
- (3) having the potential to receive intensive rehabilitation programs and could participate in the treatment actively.

Methods - exclusion

- (1) the length of stay was less than 6 weeks in PAC-CVD because of a significant functional improvement in activity of daily living (ADL, Barthel index > 85) ;
- (2) 6-minute walk test at admission ≥ 205 meters;
- (3) patients discontinued this program;
- (4) sever complications such as recurrent stroke, myocardial infarction, or other medical situation that the patients couldn't receive intensive rehabilitation program.
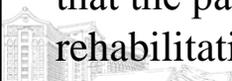
Rehabilitation

- The contents of this highly-intensive PAC-CVD rehabilitation are depending on the patient's ability, 2-3 hours of intensive rehabilitation program each treatment day, and the treatment goals are set up by the patients and our multidiscipline rehabilitation team. The maximal duration of PAC-CVD hospital of stay is limited to 12 weeks.

Primary Outcomes

- The primary outcome in this study was whether the participants had the ability to walk in the community at discharge.

- According to the study from Fulk et al,12 patients achieved ≥ 205 meters in 6-minute walk test (6MWT) were classified as community ambulators;

- participants who did not reach this distance were regarded as household ambulators.

Independent variables

- Berg Balance scale (BBS)
- 5-Meter Walk Test (5MWT)
- Mini Mental State Examination (MMSE)
- Mini Nutrition Assessment (MNA)
- Demographic characteristics such as age, gender, type of stroke, nasogastric tube or urinary catheter used at admission, days between stroke onset and admission, length of stay

Results

Sixty-seven participants met the inclusion criteria were included in this study, and 19% (n=13) of them regained the ability of community ambulation at discharge

Table 1

Table 1

Participant characteristics at admission

		At discharge		
	Total (n=67)	Household ambulator (n=54)	Community ambulator (n=13)	P Value
Age (years)	67.39 ± 14.34	69.3 ± 13.99	59.46 ± 13.47	.029*
Gender (female / male)	34 / 33	30 /24	4 /9	.109
Type of stroke (cerebral infarction / cerebral hemorrhage)	52 / 15	43 / 11	9 / 4	.466
Days between stroke onset and admission (days)	14.09 ± 7.03	13.87 ± 7.27	15 ± 6.1	.656
Length of stay (days)	65.78 ± 12.87	65.37 ± 13.26	67.46 ± 11.44	.563
Nasogastric tube used at admission (yes / no)	14 / 53	12 / 42	2 / 11	.720
Foley used at admission (yes / no)	6 / 61	6 / 48	0 / 13	.588
BBS	14.72 ± 14.37	11.61 ± 11.5	27.62 ± 18.13	.003*
5MWT (m/s)	0.11 ± 0.21	0.07 ± 0.18	0.25 ± 0.3	.022*
MMSE	19.72 ± 8.8	19.07 ± 9	22.38 ± 7.64	.305
MNA	14.57 ± 6.15	14.64 ± 6.15	14.31 ± 6.36	.905

Table 2

Table 2

Multivariate logistic regression model to predict community ambulation at discharge

Variable	B	OR (95% CI)	p-value
Age	-0.04	0.96 (0.91 - 1.01)	.097
BBS	0.06	1.07 (1.01 - 1.13)	.019
5MWT	0.95	2.06 (0.14 -49.66)	.526

BBS: Berg Balance Scale; 5MWT: 5-Meter Walk Test; B: regression coefficient; OR: odds ratio; CI: confidence interval.
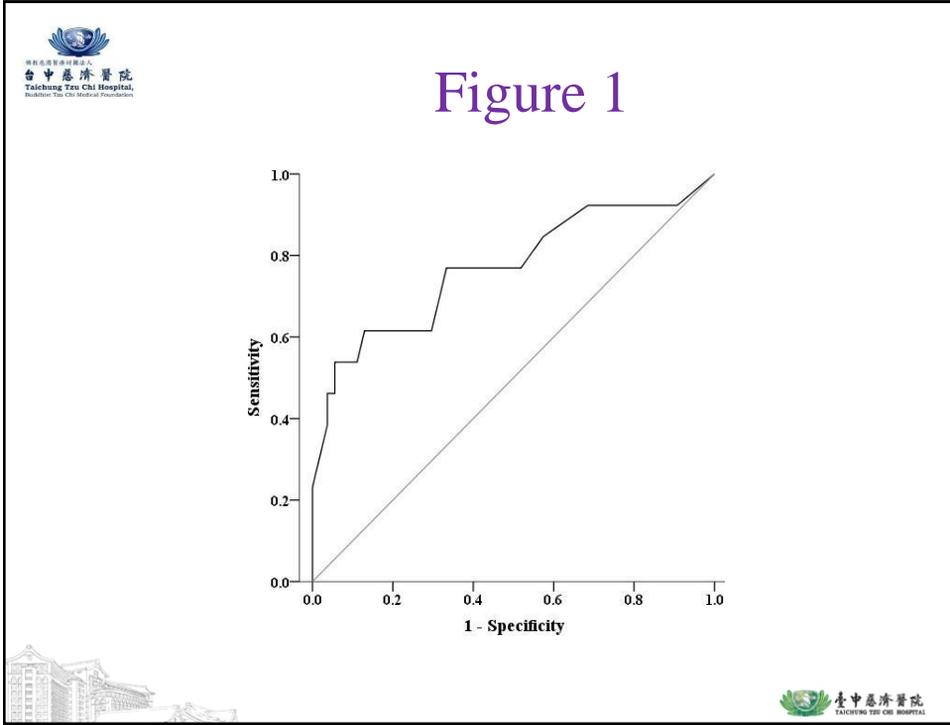
Figure 1

Table 3

Table 3
The optimal Berg Balance Scale cut-off scores at admission for community ambulation at discharge determined from the ROC curve.

BBS cut-off score	Sensitivity	Specificity	Positive likelihood ratio	Negative likelihood ratio	Area under the ROC Curves (95% CI)
≥ 29	0.62	0.87	4.75	0.44	0.77 (0.60 - 0.94)

ROC: receiver operating characteristic; BBS: Berg Balance Scale; CI: confidence interval.

Table 4

Table 4
ORs for the association of cutoff value of BBS at admission with community ambulation at discharge according to logistic regression models

	n (%)	No. of community ambulatior at discharge, n (%)	Crude OR (95% CI)	P Value	Adjusted OR* (95% CI)	P Value
BBS at admission (< 29)	52 (77.6)	5 (9.6)	Reference		Reference	
BBS at admission (≥ 29)	15 (22.4)	8 (53.3)	10.74 (2.73 - 42.30)	< 0.001	8.94 (1.8 - 44.47)	.007

OR: odds ratio; BBS: Berg Balance Scale; CI: confidence interval.
* Adjusted for age, 5-Meter Walk Test at admission.

Conclusion and future work

- younger age, better BBS scores, and faster 5MWT gait speed at admission were factors associated with community ambulation at discharge as described in table 1.

- However, under the analysis of multivariate logistic regression, only admission BBS was identified as the only significant predictor for community

Conclusion and future work

- The admission scores of Berg Balance Scale 29 could be used to predict the community walking ability at discharge.
- This study results could be used to help clinical physicians to set appropriate discharge goals after rehabilitation admission.

Thank you for your attention