

뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 15:45-16:30 Room G(3F)

P 2-116

Cut-off Score of BBS by Calculating Weight of Items for Independent Gait in Stroke Patients

Jei-Hak Myung^{1*}, Soo-Hoon Yoon¹, Sung-Bom Pyun¹, Yoon-Kyoo Kang^{1†}

Korea University Anam Hospital, Department of Rehabilitation Medicine¹

Introduction and Objective

Berg Balance Scale (BBS) is used to determine a patient's static and dynamic balance abilities objectively and is generally considered to be the gold standard of walk function. The ambulation part of the Modified Barthel Index (MBI) measures performance in the ambulation of daily living. Except for bed-ridden status and outdoor walking patients, stroke patients with lower K-BBS score occasionally walk better (K-MBI ambulation score = 12) than patients with higher K-BBS score (K-MBI ambulation score = 8). It is maybe due to there is no weight in each item of K-BBS, and there is no previous study about calculating the weight of each item in K-BBS. Thus, we calculated the weight of each item in K-BBS, cut-off score of 50 m independent ambulation and finally the essential items for 50 m independent ambulation.

Materials and Methods

This retrospective study analyzed stroke patients who walk 50 m independently (K-MBI ambulation score = 12, n=19) and stroke patients who walk dependently (K-MBI ambulation score = 8, n=19) (Table. 1.) in the Rehabilitation medicine department in a single tertiary university hospital from January 2018 to June 2019. We used Entropy method to calculate the weight of each item in K-BBS and Receiver Operating Characteristic (ROC) analysis to gain Area Under Curve (AUC) and Cut-off score of each group (using original K-BBS score versus. giving weight) and finally deducted essential K-BBS items which are needed to fulfill in order to 50 m independent ambulation by mathematical calculation.

Results

We calculated the weight of each item in K-BBS from Rank 1 (14_ Standing on one foot, weight = 0.491) to Rank 14 (3_Sitting unsupported, weight = 0.000) (Table. 2.). The total score of the weight version is 4, with a comparison to 56 of the original K-BBS version. By using ROC analysis (Fig. 1.), we could know that weight given version has higher AUC (0.928 versus. 0.881). Cut-off score of 50 m independent ambulation of each version is 38.5 for original K-BBS version (sensitivity = 0.789, specificity = 0.789) and 0.92 for weight version (sensitivity = 0.947, specificity = 0.895) (Fig. 1.). Furthermore, when we add Rank 4 to 14

with full score, it is 0.93 (cut-off score is 0.92); thus we can find when a patient started to walk, he should fulfill Rank 4 to 14 with full score, or otherwise, at least gain one or more score in Rank 3, 2, 1 group (Table. 2.).

Conclusion

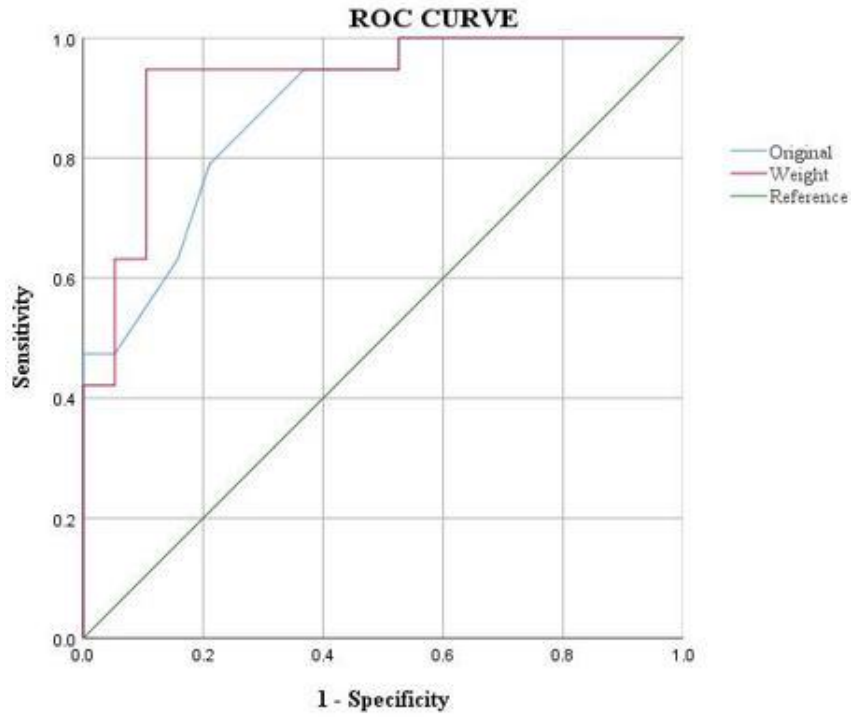
From our study, we can conclude that by calculation of the weight of each item in K-BBS, the sensitivity and specificity of a cut-off score for 50 m independent ambulation became higher. Also, when patients started to walk after being enhanced, we should educate them more focused on Rank 3 ~ 1 items; Rank_3) Placing other foot on a stool, Rank_2) Tandem standing and Rank_1) Standing on one foot. Furthermore, we can simplify the K-BBS items targeting independent gait in the future study.

Table. 1. Comparison of two group patients (50m independent ambulation versus. dependent ambulation)

| | 50 m Independent ambulation (n=19) | Dependent ambulation (n=19) |
|--------------------------|------------------------------------|-----------------------------|
| Onset age (yr) | 57.63 | 61 |
| Sex | | |
| Male (%) | 73.68 (n=14) | 68.42 (n=13) |
| Female (%) | 26.32 (n=5) | 31.58 (n=6) |
| Hemiparesis & Hemiplegia | | |
| Right (%) | 52.63 (n=10) | 68.42 (n=13) |
| Left (%) | 47.37 (n=9) | 31.58 (n=6) |
| K-BBS score | 43.53 | 31.11 |

Table. 2. Weights of each item in K-BBS from Rank 1 to 14

| Rank | K-BBS Items | Weight | Total |
|------|--|--------|-------|
| 1 | 14) Standing on one foot | 0.491 | 1.966 |
| 2 | 13) Tandem standing | 0.153 | 0.612 |
| 3 | 12) Placing other foot on a stool | 0.123 | 0.491 |
| 4 | 11) Turning 360 degree | 0.090 | 0.361 |
| 5 | 8) Reaching forward with outstretched arms | 0.047 | 0.186 |
| 6 | 5) Transfers | 0.035 | 0.139 |
| 7 | 7) Standing with feet together | 0.016 | 0.065 |
| 8 | 6) Standing with eyes closed | 0.010 | 0.041 |
| 9 | 4) Standing to sitting | 0.008 | 0.031 |
| | 9) Retrieving object from floor | 0.008 | 0.031 |
| | 10) Turning to look behind | 0.008 | 0.031 |
| 12 | 1) Sitting to standing | 0.006 | 0.026 |
| 13 | 2) Standing unsupported | 0.005 | 0.020 |
| 14 | 3) Sitting unsupported | 0.000 | 0.000 |
| | Sum | 1 | 4 |



| | AUC | P-value | Cut-off score | Sensitivity | Specificity |
|-----------------|------------|----------------|----------------------|--------------------|--------------------|
| Original | 0.881 | 0.000 | 38.5 | 0.789 | 0.789 |
| Weight | 0.928 | 0.000 | 0.92 | 0.947 | 0.895 |

Figure. 1. Receiver Operating Characteristic (ROC) analysis, Area Under Curve (AUC), Cut-off score, Sensitivity and Specificity of two version; Original K-BBS version and Weight given version.