**A DECISION MAKING ALGORITHM FOR REHABILITATION AFTER STROKE: A GUIDE TO CHOOSE AN APPROPRIATE AND SAFE TREADMILL TRAINING**

**Supplementary material**

**MATERIAL AND METHODS**

*Measurements*

Data were retrieved from the following clinical scales of demonstrated reliability, which are routinely administered to each patient on admission and recorded in our Institutional database:

* The **Cumulative Illness Rating Scale** (CIRS)1 is used to evaluate comorbidities. This instrument measures disease burden in individuals with various chronic diseases giving information about severity and comorbidity concerning 14 organ systems, rating each organ system from 0 to 4. The present study considered the number of different organ systems involved (CIRS 1) or the number of organ systems with score >3 (CIRS 2).
* The **Functional Ambulation Classification (FAC)** 2 is a qualitative scale assessing the amount of human assistance required with walking. Patients are rated from 0 = nonfunctional ambulation to 5 = ambulation-independent.
* The **Functional Independence Measure (FIM)**3 assesses the patient’s degree of independence and need of assistance in performing basic ADLs. It is an 18-item ordinal scale with7 levels ranging from 1 (total dependence) to 7 (total independence). The FIM can be subdivided into a 13-item motor subscale (eating, self-care, bathing, dressing upper body, dressing lower body, personal hygiene, bladder control, bowel control, transfer to bed/chair/wheelchair, transfer to toilet, transfer to tub/shower, walk or wheelchair, stairs) and a 5-item cognitive subscale (comprehension, expression, social interaction, problem solving, memory). The motor subscale score ranges from 13 to 91 (motor-FIM) and the cognitive score from 5 to 35 (cognitive-FIM). The maximum total score is 126 and refers to the best performance. The FIM is administered by a qualified physiatrist.
* The **Tinetti Performance-Oriented Mobility Assessment**4 assesses patients’ balance from a clinical point of view, in elderly (> 64 years) and in healthy condition or in patients suffering from mild/moderate dementia, stroke, or Parkinson’s disease. The Tinetti scale has a balance (Tinetti A) and a gait (Tinetti B) component. Each item is scored on a 3-point ordinal scale ranging from 0 to 2. The maximum score for A is 16, for B is 12 and for A+B is 28 (high scores indicate best performance). Patients are classified into three main categories: Inability to keep upright (score 0-1); Non autonomous or insecure walking posture - Risk of falls (score 2-18); Autonomous posture and walking - Low risk of falls (score 19-28).

The following scale/s were used to assess patients’ risk of fall profile:

* + The **Morse Fall Scale (MFS)**5 consists of 6 questions that investigate: previous falls, the presence of pathologies at risk of falls, mobility, intravenous therapy, gait and mental state. It is administered by the nurse on admission. Based on the score (0 to 150), patients are classified as low risk (0-24), medium risk (25-50), or high risk (≥51).
  + If the MFS score is >50, patients are re-assessed with the **Stratify scale**6. The Stratify investigates 5 factors that seek to convey the patient's risk of falling, but there is no a cut-off value given to indicate the presence of fall risk – we used the value of 2 for this study. Each variable, apart from the first which is verified by the detector on the clinical documentation, is obtained by interview from the primary nurse assigned to the patient.

**RESULTS**

Algorithm development

Discriminating cut-offs and health staff employment that were associated to the 4 risk classes are descripted below:

* RS 4 class – BWSTT with a dedicated PT (1:1 PT/patient ratio): patients presenting FAC≤1 and patients with FAC>1 and Tinetti ≤5;
* RS 3 class – BWSTT with PT supervision only (1:>1 PT/patient ratio): patients presenting FAC>1 and Tinetti between 6 and 14 included;
* RS 2 class – FreeTT with aid of bars and PT supervision (1:>1 PT/patient ratio): patients presenting FAC>1 and Tinetti between 15 and 22 included;
* RS 1 class – FreeTT without aid of bars but only PT supervision (1:>1 PT/patient): patients presenting FAC>1 and Tinetti ≥23

Adverse events/annotations

The following annotations/adverse events were recorded:

* One patient had an angina episode;
* One patient fell on the treadmill due to a partial release of the BWS harness (incorrect coupling);
* Two patients from the FreeTT group were switched to the BWSTT group (n.119 was “a simulator patient", so not safe to perform FreeTT; in n.134 a balance deficit was discovered and PT attention and support was needed). These two patients were, in fact, both assigned by the decision-making algorithm to RS3 class, hence with BWS.
* Two patients (n.148 and n.153) who initially had been allowed to walk freely on TT revealed fatigue or weakness that required a switch to the use of supporting bars. Both patients were, in fact, assigned by the decision-making algorithm to RS2 class, hence to TT with the support of bars.

**REFERENCES**

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