Original article

Construction and feasibility study of the SOFMER Activity Score (SAS), a new assessment of physical and cognitive activity

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A B S T R A C T

Objectives: For hospitalizations in rehabilitation centers (RCs) in France, the quantification of healthcare givers’ activity is based on the dependency of the patients, defined as a total or partial inability to perform activities required for daily living without help. The tools currently used to quantify dependency are not sufficiently precise. Here we describe the construction of a new tool, the SOFMER Activity Score (SAS scoring), which allows for a good description of the level of activity of patients hospitalized in RCs, and a feasibility study of the tool.

Methods: After a study group proposed the first version of the SAS, the validity of its content was studied by the Delphi consensus method: 26 physicians or healthcare professionals known for their expertise in PMR responded to the first round. The feasibility study was prospective and involved multi-site professionals. Data related to the SAS determined by a multidisciplinary team were collected and compared to the Activités de la Vie Quotidienne (AVQ) scale, which is administered to all patients and included in medical and administrative data.

Results: We included 81 patients in the feasibility study. The mean (SD) time to obtain the SAS was 4.5 (3.3) min. For 97.5% of scorings, the participating professionals judged that the SAS was compatible or fairly compatible with clinical practice. The internal structure of the SAS scale seemed better than that of the AVQ scale, for which the present study confirmed a floor effect for all items.

Conclusions: The SAS allows for measuring the level of physical and cognitive activity of a patient hospitalized in an RC. If validated studies for the SAS, exploring its reliability, construct validity or criterion validity, confirm the tool’s good metrological qualities, the SAS will allow for a good quantification of the burden of care.

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1 See Appendix A.

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1. Introduction

The dependency of a person is defined as their total or partial inability to perform activities required for daily living without help due to activity limitations in the normal environment. The consequence is a restriction in participation, in terms of the International Classification of Functioning, Disability and Health (ICF) [1].

For hospitalizations in rehabilitation centers (RCs), given the pathologies of patients and lengths of hospitalization, the dependence of the patient must take into account both motor and cognitive aspects when quantifying the activity of the healthcare staff. The limitations of the patient’s activity affect the provision of care (basic or relational) by nursing staff and the performance of reeducation and rehabilitation activities by therapists (modification of the installation time in the reeducation room, fatigability, behavioral disorders, etc.). Cognitive dependence should not be disregarded because it can be a care burden for healthcare professionals, at least as important as physical dependence. Therefore, dependence in all its aspects should be accounted for when quantifying the medical and paramedical activity of a department. The relation between dependence and burden of care must be explored because although they are obviously linked, they are not equivalent. For example, the burden of care could be lighter if a patient has to be totally washed as compared with a patient who has to be stimulated during the washing.

In physical and rehabilitation medicine (PRM), in which the evaluation is central and dependence a priority for action for therapeutic interventions, many validated scales are used to assess the dependence of patients. Some of these, such as the Barthel Index [2], validated for patients with neurological post-stroke, or the Instrumental Activities of Daily Living [3] mainly used in geriatric RCs, are more specific to a particular population. The Functional Independence Measure (FIM) [4], with its pediatric version, the WeeFIM [5], is more often used in RCs. It has good metrological qualities and allows for measuring both the level of physical and cognitive activity. It consists of a rater-administered assessment of performance (measurement of what the patient actually does, as opposed to measurement of abilities exploring the maximum that the patient can do) investigating 6 domains divided into 13 items for motricity and 5 items for cognition. Each item is rated on 7 levels, based on the need for technical help, monitoring or required help [4,6–9]. Although the FIM is adapted for several diseases [5,6,8,10], it has limitations for low back pain, shoulder disorders [4], as well as vascular and respiratory diseases [11]. Because of the length of time required to administer the scale in French (from 30 to 45 min) [12], its routine use is difficult for quantifying the dependency of each hospitalized patient.

In France, as part of the collection of medical and administrative data for patients (Programme de médicalisation des systèmes d’information [PMSI]) [13], dependence has been assessed in RCs since 1997 by use of a French scale, the Activité de la Vie Quotidienne (AVQ), composed of 6 items (4 physical items and 2 cognitive items). However, this scale has never been validated [14] and many practitioners criticize particularly the lack of standardized guidance, a suspected large floor effect, the under-evaluation of the cognitive dependence, and the unsuitability or even unusability in some populations, especially pediatrics.

Given the limitations of existing scales, in 2015, the French society for PRM (SOFMER) proposed to create and validate a new classification of activity measurement based on the ICF model, the SOFMER Activity Score (SAS). The SAS was to be easy to use, allow for rapid generation of a score and be adapted for use during a multidisciplinary review meeting, while avoiding a floor effect and providing a good and reproducible description of the physical and cognitive dependence of pediatric and adult patients hospitalized in RCs. If the SAS showed good metrological properties and was able to quantify the burden of care well, it could be used for clinical practice and could better identify the resources required for hospital care in a medical or economic approach.

Here, we present the construction of the SAS, an analysis of the validity of the content, and the results of a feasibility study, which is a preliminary step before validation studies.

2. Materials and methods

The different development stages of the SAS are described in Fig. 1.

2.1. Construction of the first version of the SAS

An exhaustive review of the literature related to the different tools used for evaluating the dependence of hospitalized patients was performed. A working group consisting of 4 PMR physicians, 2 healthcare managers, 1 childcare assistant, 1 physiotherapist, 1 senior hospital technician and 1 clinical research associate was involved in developing the first version of the SAS (called SAS_V1) during 2 meetings between May and June 2015. Two members of the group had purely pediatric experience and 6 had experience with adults and/or geriatrics. The years of experience ranged from 6 to 25 (mean 13.7).

The different scoring fields (headings and descriptions of the activity fields) were adapted from the ICF activity fields, with a proposition of 4 fields for physical activities (“Hygiene, dressing”, “Mobility”, “Feeding”, “Elimination”) and 4 fields for cognitive activities (“Communication”, “Memory, learning”, “Relationships with others”, “Judgment, initiative and control of activity”).

For each of the activity fields, the working group proposed a 5-level classification system for the activities (Level 1: “Activity possible without help”, Level 2: “Activity possible with technical help and/or adjustment but without human help”, Level 3: “Activity possible with human help”, Level 4: “Activity possible with continuous human help”, Level 5: “Activity impossible regardless of help”).

To help with the scoring, a section “Introduction and instructions for the user” specifies the scoring methods, and clinical thumbnail images were proposed to illustrate the practical use of the scoring.

The scoring was tested by members of the working group on 33 patients hospitalized in RCs to perform an experimental study.

2.2. Analysis of the validity of the content: Delphi method

To analyze the validity of the content of the proposed SAS_V1, the Delphi method [15–17] was used via email. This stage allowed for collecting the opinion and comments of several French PMR experts concerning the relevance of the scoring’s content, particularly the relevance of the fields selected and their scoring procedure.

Overall, 32 physicians or healthcare professionals known for their expertise in PMR and not having participated in the first phase of the study, were invited to participate; 26 responded to the first round of Delphi (10 PRM physicians, 3 geriatrists, 3 pediatricians, 2 Department of Medical Information doctors, 2 hospital directors, 1 general practitioner, 2 heads of physiotherapy, 2 occupational therapists and 1 director of the department of nursing). Eight participants had expertise in pediatrics, 20 in adult patients and 8 in geriatrics; 10 experts practiced in a public establishment and 16 in a private establishment. Their experience in the field of PMR ranged from 2 to 35 years (mean [SD] 19.9 [10.3] years).
For each of the 3 rounds of the Delphi method, the questionnaire was divided into 4 sections (values of the scoring, scoring procedure, and definition of severity levels and the activity fields) and included 33, 17 and 4 statements, respectively. An open response was associated with each statement to encourage the experts to clarify their answer. Each statement was evaluated on a 9-point Likert scale, from 1, strongly disagree, to 9, strongly agree. The definition of the consensus adopted was that proposed by Brook et al. [18]; the proposition was judged appropriate if:

- the median value of the responses was \( \geq 7 \);
- at least 80% of the experts gave a score \( \geq 7 \);
- there was an absence of disagreement, defined as a distribution of at least 30% of the individual scores between 1 and 3, and 30% between 7 and 9.

The experts were asked to use the SAS in their daily practice before answering the questionnaire. A total of 20 experts provided responses for the 3 questionnaires.

2.3. Feasibility study

The main aims of the feasibility study were to confirm the hypothesis conceived during the construction of the SAS, namely 1) the identification of a fifth level would allow for correcting the floor effect of the AVQ, and 2) the time needed to score the SAS during a multidisciplinary review meeting is compatible with the clinical activity.

This was a cross-sectional, prospective, non-interventional, multi-site study that was approved by an ethics committee (Comité...
de protection des personnes Lyon Sud-Est II, Institutional review board: 00009118).

2.4. Participating patients

The patients enrolled in the study were at least 2 years old and were hospitalized in a RC department for at least 4 days, and they or their parent gave consent. No non-inclusion criteria were applied. Enrolled patients were admitted to 8 RCs in the Rhône-Alpes region of mainland France, representing 3 adult, 3 geriatric, and 2 pediatric departments from 3 university hospital centers and 5 private or public non-profit establishments.

2.5. Collected data

For each enrolled patient, the SAS_V1.3 version (Fig. 1) was to be completed during a multidisciplinary review meeting with at least 3 professionals of 2 different professional categories in the RC (physician, registered nurse, auxiliary nurse, therapist, educator, etc.). The day of the SAS administration, the following data were collected: age and sex of the patient, date of admission to the department, type of stay and pathology requiring the stay in the RC, scores for the different items of the SAS, occupations of those participating in the scoring, and the time required to administer the SAS. The opinion of the teams on the SAS according to different criteria (compatibility with clinical practice, exhaustiveness, accuracy and discriminating character) was scored on a 4-point scale.

Scores for the AVQ [13], automatically collected since 1997 for each patient hospitalized in an RC, was obtained within 1 week of the SAS from the medical and administrative database. The AVQ, designed to measure activities of daily living, consists of 6 items: 4 physical (dressing, movement and locomotion, feeding, continence-elimination hygiene) and 2 cognitive (behavior, communication) prioritized in 4 scoring stages that increase with level of dependence: Level 1, independence (without the intervention of a third-party caregiver); Level 2, supervision or understanding (presence of a third-party caregiver without physical contact); Level 3, partial assistance (help from a third-party caregiver); Level 4, full assistance (carried out by a third-party caregiver).

2.6. Statistical analysis

Analyses were performed on all patients enrolled in the feasibility study. Quantitative data are described by number (%), mean (SD) and range. Categorical data are described by number (%) for each level of variables and missing values (missing values were counted but were not included in the calculation of numbers and percentages). If one of the scores for a dimension of the SAS or the AVQ was missing, the total score by dimension was not calculated and was considered missing. A floor effect was considered significant in a classification if more than 15% of participants had the lower-limit score for the classification (Level 1 for the SAS and Level 4 for the AVQ) [19,20]. Correlations between the dimensions of the SAS and the AVQ were estimated by Spearman’s correlation coefficient (r). The number of professionals participating in the SAS administration to patients in pediatric departments was compared to that in adult departments by the Wilcoxon-Mann-Whitney test. Correlations are provided with their 95% confidence intervals. All tests were bilateral and P < 0.05 was considered statistically significant. The analysis involved use of SAS v9.3.

3. Results

3.1. Construction of the first version of the SAS (SAS_V1) and qualitative analysis of the validity of the content

During the first round of the Delphi method, consensus was reached for 12 of the 33 statements concerning the SAS_V1. The experts agreed on the need to create a new evaluation score for achievement level for the physical and cognitive activities of patients hospitalized in RCs. Three descriptions of the severity levels received approval. Because the SAS is an activity score and not a dependence score, severity levels were changed, with level 1 corresponding to “Activity impossible regardless of help” and level 5 corresponding to “Activity possible without help”. Only one activity field (“Feeding”) obtained a favorable consensus. After the first round of the Delphi, the SAS was revised by using the experts’ comments and was returned to them, along with the second-round questionnaire. Then, agreement was reached for 12 of the 17 statements. Agreement was not reached on only cognitive activities, particularly sufficient help in scoring the clinical thumbnails for the cognitive activities and the “Communication” and “Memory” fields. After revising the scoring and a third round, agreement was reached on the remaining 4 statements.

3.2. Feasibility study

The population enrolled in this study is described in Table 1. Patients older than 70 years were the least represented (21%) and 51% percent of patients had a wheelchair.

The mean number of professionals taking part in the SAS scoring was 6.4 (range 2–11). During scoring, at least 1 physician was present, mainly a PMR physician (90.1%). The most represented non-medical professionals were nurses (92.6% of scores), physiotherapists (75.3%), social workers (72.8%), occupational therapists (69.1%), and educators (74.7%). The number of professionals participating in the scoring was higher for pediatric patients than adult and geriatric patients (7.6 vs 5.8 and 5.9; P < 0.0001). The mean (SD) time required for a scoring was 4.5

Table 1 Description of the population studied for the feasibility study of the SOFMER Activity Score (SAS) (n = 81).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age category, years (%)</td>
<td></td>
</tr>
<tr>
<td>&lt; 18</td>
<td>28 (34.6)</td>
</tr>
<tr>
<td>18–70</td>
<td>36 (44.4)</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>17 (21.0)</td>
</tr>
<tr>
<td>Age, years, mean (SD)</td>
<td>43.15 (28.0)</td>
</tr>
<tr>
<td>Sex ratio, female/male</td>
<td>1.3</td>
</tr>
<tr>
<td>Wheelchair, yes (%)</td>
<td>51.00%</td>
</tr>
<tr>
<td>Type of rehabilitation center (%)</td>
<td></td>
</tr>
<tr>
<td>Polyaental</td>
<td>11 (13.6)</td>
</tr>
<tr>
<td>Specialized–Neurology</td>
<td>31 (38.3)</td>
</tr>
<tr>
<td>Specialized–Pediatrics</td>
<td>16 (19.8)</td>
</tr>
<tr>
<td>Specialized–Orthopedics</td>
<td>12 (14.8)</td>
</tr>
<tr>
<td>Specialized–Cardiology</td>
<td>5 (6.2)</td>
</tr>
<tr>
<td>Specialized–Geriatrics</td>
<td>4 (4.9)</td>
</tr>
<tr>
<td>Specialized–Oncology</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Pathology justifying the stay (%)</td>
<td></td>
</tr>
<tr>
<td>Neurological of central origin</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>13 (16.0)</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>6 (7.4)</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>8 (9.9)</td>
</tr>
<tr>
<td>Head trauma</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Degenerative</td>
<td>4 (4.9)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (9.9)</td>
</tr>
<tr>
<td>Neurological of peripheral origin</td>
<td></td>
</tr>
<tr>
<td>Charcot-Marie-Tooth</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Guillain Barre syndrome</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>21 (25.9)</td>
</tr>
<tr>
<td>Cardiopulmonary</td>
<td>6 (7.4)</td>
</tr>
<tr>
<td>Rheumatological</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (9.9)</td>
</tr>
</tbody>
</table>
(3.3) min (range 1–15) and the mean (SD) interval between the day of the SAS and the AVQ scoring was 1.6 (1.8) days (range 0–5), thereby suggesting stability of the patient’s activity level between the 2 scorings.

During 97.5% of the scorings, the professionals participating in the scoring judged that the SAS was fair or fairly accurate, and during 77.8% of scorings, it was judged complete or fairly complete. However, 68.8% of professionals judged the tool to be indiscriminate or fairly indiscriminate (i.e., insufficient for differentiating 2 patients).

3.3. Distribution of patients’ level of activity on the SAS

The distribution of patients among the SAS activity levels seemed satisfactory because at the total population level, patients were rated in all levels (Fig. 2). Distribution based on the level of activity of the SAS varied: Level 4 (“Activity possible with technical help and/or adjustment but without human help”) was the least represented, particularly for cognitive items. Indeed, 9.9% of patients were rated at Level 4 for the item “Relationships with others”, 4.9% for “Communication”, 1.3% for “Memory” and 1.2% for “Execution of tasks”. The distribution of patients among levels differed by age: particularly, patients over 70 years old were rated at Level 1 “Activity impossible regardless of help” for 6 of the 8 items of the SAS (Supplementary material 1).

3.4. Floor effect of AVQ and SAS

A floor effect was identified for all the items of the AVQ for the whole study population: 41.0% of patients were rated in the lowest activity level (Level 4; “Help or total assistance”) for “Dressing”, 34.6% for “Movement and locomotion”, 29.5% for “Dressing, elimination hygiene”, 23.1% for “Behavior”, 21.8% for “Feeding” and 21.8% for “Communication” (Fig. 2). A floor effect was found for all items for patients under 18 and over 70 years old; it was present for 3 items for patients between 18 and 70 years old (Supplementary material 2).

For the SAS, more patients were rated in the extreme lower level for physical items (Level 1; “Activity impossible regardless of help”) than cognitive items, with a floor effect observed for items “Elimination”, “Execution of tasks” and “Hygiene, dressing” (23.5%, 16.3% and 16.1% of patients, respectively). For 2 of the 4 physical items (“Feeding” and “Elimination”) and for the 4 cognitive items, the maximum activity level (Level 5) was the most-often rated level, which reflects a ceiling effect (Fig. 2).

3.5. Correlation between AVQ and SAS items

We found a better correlation between the physical items of the AVQ and those of the SAS than between the cognitive items of the AVQ and those of the SAS: $r_s = -0.875$ ($P < 0.001$) and $-0.445$ ($P < 0.001$), respectively (Table 2). The physical and cognitive items of the SAS were better correlated than were the physical and cognitive items of the AVQ: $r_s = 0.735$ ($P < 0.001$) and $0.538$ ($P < 0.001$), respectively, which suggests a better construct validity of the SAS.

Scoring differences for SAS and AVQ items considered comparable are presented in Table 3. For each comparison, the most frequent difference was 0 (i.e., identical score) and ranged from 37.2 to 65.4%. For most inconsistencies (68%), SAS scores were greater than those of the AVQ. A positive or negative difference of 1 point was the most frequent inconsistency (71.0% of all inconsistencies).

4. Discussion

Here we describe the construction of a new tool, the SOFMER Activity Score (SAS scoring), which allows for a good description of the level of activity of patients hospitalized in RCs. In this study, we confirmed that the AVQ has methodological limitations, in particular a significant floor effect for all of its items (more than 20% of
patients were rated at the lower limit score for all items. The SAS, with its 5 levels, showed limited floor effect (only 1 item included more than 20% of patients rated at the lower limit score). The SAS, with its 4 cognitive items, was able to improve on the cognitive description of patients. The better correlation between the physical and cognitive items ($r_s = 0.735$ for the SAS vs $r_s = 0.538$ for the AVQ) could suggest a better construct validity of the SAS in accordance with the following hypothesis: the more a patient is affected in physical items, the higher the risk of having affected cognitive items. These results support the literature, which regrettably lacks validation of the AVQ and its methodological limitations, particularly for the cognitive aspect [14].

In terms of the qualification of patients’ activity level and taking into account the diversity of views by type of professional (physician, nurse, rehabilitation workers, educators, etc.) and specialty (pediatrician, PRM physician, geriatrician, etc.), it seemed relevant to use the Delphi method to develop the score; this approach is frequently used in the early phases of development of a score to improve the validity of the content [21]. This method allowed us to survey a sample of professionals representing a large spectrum of knowledge and experience and to stimulate a constructive debate while preventing a leadership effect in a group, which can prevent certain members from expressing their suggestions. During this step, 2 major modifications were applied to the proposed SAS_V1: a better definition of the terms used to describe the physical and cognitive activity field and a 5-stage prioritization for scoring that increased in function of the activity level. The order of the scoring levels was inverted after the first round of the Delphi, with level 1 corresponding to the minimum level of activity and level 5 corresponding to the maximum.

The feasibility study performed with 81 patients suggested that the SAS had better methodological qualities than the AVQ because of the inclusion of an additional severity level that corresponds to the activity being impossible regardless of help provided, the addition of 2 cognitive items, and the scoring method used (during the multidisciplinary review meeting). This score was well received by the professionals questioned who, for most, confirmed its applicability in clinical practice and its assumed accuracy. A modest floor effect (a maximum of 23.5% in Level 1) was found in only 3 of the 8 items of the SAS. There also appeared to be a better internal structure to the SAS, which was confirmed by a significant correlation between the physical and cognitive items of the SAS as compared with the AVQ. Although the correlation was high and significant between the physical items of the SAS and the AVQ, a poor correlation was found between the cognitive items of the SAS and the AVQ. This result is due to only a few items in the AVQ describing the cognitive aspect of patients (only “Communication” and “Behavior”), whereas 4 such items are included in the SAS. Owing to the different methods of administration and/or definition, the cognitive aspects measured were different between the 2 scales. The quality of the cognitive measurement of the SAS remains to be determined via a validation study against criteria [22]. A ceiling effect was found for all the items of the SAS, with a larger effect for 3 cognitive items (“Communication”, “Relationship with others” and “Memory”).

Some levels were under-represented in certain items of the SAS. And Level 4 of the categories “Memory” and “Execution of tasks” and Level 1 of the category “Communication” remained under-represented in all 3 age groups considered (see Supplementary material 1). A study based on a larger population including a wider range of pathologies and type of RC would be necessary to investigate whether these trends are specific or not to the study population, and if this is the case this would lead to modifications.

Significant inconsistencies (scoring differences of 3 levels for comparable SAS and AVQ items) were identified for the scoring of 17 items for 15 patients, the cognitive items being the most frequently involved compared to the physical items (2.2% vs. 6.4% of scores, respectively). Certain inconsistencies were attributed to a lack of clarity in the SAS with regard to supervision. Indeed, when an AVQ score level was aimed at rating only the need for supervision, the SAS considered supervision in the same way as human help because it required the presence of a person, whether they were in physical contact with the patient or not. Therefore, we propose to add the notion of supervision to the description of Level 3 in the SAS.

To explain these inconsistencies, we can also note the difference with respect to the scoring of the 2 scales. The SAS was systematically scored in this study by a multidisciplinary team, whereas the AVQ was scored, depending on the department, in uncontrollable conditions by a nurse, an auxiliary nurse or a healthcare manager. The literature confirms the lack of agreement between the quantification of functional independence level made by one individual and that made by a group [23]. For the SAS, the

### Table 2

<table>
<thead>
<tr>
<th>P_AVQ</th>
<th>C_AVQ</th>
<th>P_SAS</th>
<th>C2_SAS</th>
<th>C4_SAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.538</td>
<td>0.538</td>
<td>0.875</td>
<td>0.577</td>
<td>0.680</td>
</tr>
<tr>
<td>0.538</td>
<td>0.538</td>
<td>0.490</td>
<td>0.489</td>
<td>0.445</td>
</tr>
<tr>
<td>0.875</td>
<td>0.490</td>
<td>0.584</td>
<td>0.735</td>
<td></td>
</tr>
<tr>
<td>0.577</td>
<td>0.490</td>
<td>0.584</td>
<td>0.735</td>
<td></td>
</tr>
<tr>
<td>0.875</td>
<td>0.490</td>
<td>0.584</td>
<td>0.735</td>
<td></td>
</tr>
</tbody>
</table>

Physical items of the AVQ (P_AVQ) were summarized by the sum of the scores of its 4 physical activity items. Cognitive items of the AVQ (C_AVQ) were summarized by the sum of the scores of its 2 cognitive activity items. Physical items of the SAS (P_SAS) were summarized by the sum of the scores of its 4 physical activity items. Cognitive items of the SAS were summarized by the sum of the scores of the items “Communication” and “Relationship with others” (C2_SAS) or by the sum of the scores of its 4 cognitive activity items (C4_SAS).

$p < 0.001$

### Table 3

<table>
<thead>
<tr>
<th>Difference in scoring</th>
<th>SAS Hygiene, dressing vs AVQ Dressing (n=78) (%)</th>
<th>SAS Feeding vs AVQ Feeding (n=78) (%)</th>
<th>SAS Mobility vs AVQ Movement and locomotion (n=78)</th>
<th>SAS Elimination vs AVQ Continence-elimination hygiene (n=78) (%)</th>
<th>SAS Communication vs AVQ Communication (%)</th>
<th>SAS Relationship with others vs AVQ Behavior (n=78) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>−3</td>
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The following levels were redefined for the consistency calculation: SAS levels: level 1 and level 2 = 1; level 3 = 2; level 4 = 3; level 5 = 4; AVQ levels: level 1 = 4; level 2 = 3; level 3 = 2; level 4 = 1; Difference in scoring = Level of SAS item – Level of AVQ item.
emphasized the need to rate the day-to-day performance of the patient as defined by the ICF (i.e., what the patient actually does) as opposed to the capacity, which describes the maximum that the patient can do with a suitable environment, because these 2 measurements are different [24]. The rehabilitation workers, educators, and physicians have a tendency to consider the patient in terms of the maximum they can do when everything is put in place to develop the independence of the person, whereas nurses and/or auxiliary nurses, in keeping with the notion of temporality, have a tendency to more readily help the patients with a problem of day-to-day effectiveness. We think that the joint opinion of the different professionals is more likely to describe the real abilities of the patient.

5. Conclusion

The SAS is now in a position to be evaluated in a multi-center validation study exploring its metrological properties. In particular, its construct validity (with an exploratory factor analysis), its reliability (with test–retest and inter-rater studies), its criterion validity (with the FIM used as a gold standard), its convergent validity (analysis of correlation between SAS scoring and human and material aids needed within the service for each patient), the time required to complete each care, or the number of people needed to perform the care) will be assessed, as well as its sensitivity to change. After these steps, a better quantification of burden of care will be expected by using the SAS for patients hospitalized in an RC. A quantification of the burden of care closest to the needs of the patient will allow for an optimal participation for the patient in connection with sufficiently staffed teams, to overcome the patient’s limitations during the hospitalization and to plan discharge and the return home.

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Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. SAS study group

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Appendix B. Supplementary data


References


