ADAPTATION OF THE VISUAL ANALOG SLEEP SCALES TO PORTUGUESE[1]

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Bergamasco EC, Cruz DALM. Adaptation of the Visual Analog Sleep Scales to Portuguese. Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):998-1004.

This article reports the adaptation of the Visual Analog Sleep (VAS) Scales developed to assess patients' perception about their sleep on the previous 24 hours. Original scales, translated to Portuguese and submitted to content validation, were tested for reliability and validity. Convenience sample was composed of 180 patients on the first postoperative day (mean age 39.3±12.3 years; 68.3% female). The Disturbance Scale was kept with 7 items (α=.80) and the Effectiveness Scale with 5 items (α=.78); both maintained the original structure. Item 13 (Wake after final arousal) had to be excluded from Supplementation Scale, that kept 3 out of its 4 items (α=.72). There was negative correlation between Disturbance and Effectiveness (r=-.68 p<.001), as it was expected. The adapted version is suitable to sleep assessment of postoperative patients. The behavior of the excluded item has to be analyzed with other samples.

DESCRIPTORS: sleep; nursing assessment; perioperative nursing; psychometrics

ADAPTACIÓN DEL VISUAL ANALOG SLEEP SCALES A LA LENGUA PORTUGUESA

Este articulo relata la adaptación de las Visual Analog Sleep (VAS) Scales, que evalúan la percepción cuanto el sueño en el día anterior. Las escalas, traducidas para el portugués y ajustadas después de validación aparente, fueran sometidas a testes de confiabilidad y validad. La muestra de conveniencia abarcó a 180 pacientes en el primero día postoperatorio (edad media 39,3±12,3 anos; 68,3% mujeres). La escala de Disturbio se mantuvo con 7 ítems (α=0,80) y la Escala de Efectividad con 5 ítems (α=0,78). El ítem 13 (Levantarse después de el despertar final) tuvo que ser excluido de la escala de Suplementación, restándole 3 de los 4 ítems (α= 0,72). Hubo correlación negativa entre el Disturbio y Efectividad (r=-0,68 p<0,001), conforme esperado. El instrumento adaptado demostró características adecuadas para evaluar el sueño de pacientes en postoperatorio. El comportamiento del ítem excluido se debe analizar en estudios con otras muestras de pacientes.

DESCRIPTORES: sueño; evaluación en enfermería; enfermería perioperatoria; psicometría

ADAPTAÇÃO DAS VISUAL ANALOG SLEEP SCALES PARA A LÍNGUA PORTUGUESA

Este artigo relata a adaptação das Visual Analog Sleep (VAS) Scales que avaliam a percepção da pessoa quanto ao sono do dia anterior. As escalas, traduzidas para o português (Escalas Visuais Análogas - Sono) e ajustadas após validação aparente, foram submetidas a testes empíricos de confiabilidade e validade. A amostra de conveniência foi de 180 pacientes em primeiro pós-operatório (idade média de 39,3±12,3 anos; 68,3% mulheres). Como no original, a Escala de Distúrbio manteve-se com 7 itens (α=0,80) e a Escala de Efetividade com 5 itens (α=0,78). Da Escala de Suplementação, originalmente composta por 4 itens, foi excluído o item 13 (Tempo para levantar após despertar), ficando com 3 itens (α=0,72). Houve correlação negativa entre Distúrbio e Efetividade (r=-0,68 p<0,001), conforme esperado. O instrumento adaptado mostrou propriedades adequadas para avaliar o sono de pacientes em pós-operatório. O comportamento do item excluído deve ser analisado em estudos com outras amostras de pacientes.

DESCRITORES: sono; avaliação em enfermagem; enfermagem perioperatória; psicometria

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INTRODUCTION

Sleep alterations are frequent responses in samples of patients in different clinical and surgical situations[1-7]. The proposal of interventions that help patients to deal with these alterations depends on adequate assessment of sleep during the nights the patient spends in hospital.

This paper reports on a study in which an instrument created in English to assess a night's sleep was adapted and validated for Portuguese. Assessing sleep and rest is part of recommendations for daily nursing assessments and aims to describe their efficacy in the client's perspective[8].

Having an instrument to assess a night's sleep is important for research about factors interfering in the sleep of hospitalized patients, as well as for studies testing interventions to relieve sleep problems deriving from or stressed by hospitalization.

Sleep is defined as a functional, physiological, reversible and cyclical state that interrupts the wake period, permits restoring the conditions from the start of the preceding wake and presents characteristic behavioral manifestations, such as relative immobility and increased threshold of response to external stimuli[9].

The methods used to assess sleep and rest can be separated in two groups: those using equipment and self-report methods. Examples of the first group are polysonography and actigraphy, which use equipment to provide information about sleep, but are expensive and complex to apply. The other group includes interviews, diaries and standardized instruments, filled out by the patients themselves or by an evaluator. Sleep diaries are used in studies to assess the patient's sleep and rest pattern over an extended period and are completed by the patient every day. Literature presents different instruments developed to outline a person's sleep pattern or to obtain information about specific sleep conditions[10].

Considering the importance of assessing hospitalized patients' sleep on a daily basis and the inexistence of instruments in Portuguese for this goal, this article reports on a study to adapt the *Visual Analog Sleep* (VAS) Scales[11-12].

Visual Analog Sleep Scales (VAS Scales)

The instrument was developed as a modification of the *Verran Snyder-Halpern Sleep Scale*[11], aimed at performing a subjective evaluation of sleep efficiency during the 24 hours before the assessment. It is applicable to hospitalized patients, relatively easy to use and there is information about its psychometric properties in the environment it was created in. It consists of 16 items: 15 self-report items in a visual analog format and 1 item obtained by adding the scores of two of the 15 self-report items. The 16 items are distributed in three domains or scales. Table 1 presents the operational definitions of the scales and characteristics and, to preserve space, the numbers of the corresponding items in the original version of the instrument (in English) are also included.

Table 1 - Definitions of scales and characteristics of VAS Scales*

1. Disturbance Scale - Perception of the degree the bulk sleep period was disturbed due to fragmentation and sleep latency	
1.1. Fragmentation Characteristics	
Mid-Sleep Awakening (Item 9)	Perception of the number of awakenings during the sleep period
Wake After Sleep Onset (Item 1)	Perception of the amount of time spent awake during the Total Sleep Period
Movement During Sleep (Item 11)	Perception of the amount of movement during sleep
Soundness of Sleep (Item 7)	Perception of sleep depth
Quality of Disturbance (Item 8)	Perception of the degree of difficulty with sleep disturbance
1.2. Latency characteristics	
Sleep Latency (Item 6)	Perception of the amount of time from settling down to sleep until falling asleep
Quality of Latency (Item 10)	Perception of the degree of difficulty in going to sleep
2. Effectiveness Scale - Perception of the degree the bulk sleep period was considered to be effective	
2.1. Quality Characteristics	
Rest Upon Awakening (Item 12)	Perception of how rested the person is upon awakening
Subjective Quality of Sleep (Item 14)	Perception of sleep adequacy in terms of overall quality
Sleep Sufficiency Evaluation (Item 15)	Perception of adequacy of amount of sleep
2.2. Length Characteristics	
Total Sleep Time (Item 2)	Perception of the total time spent in actual sleep during the bulk sleep period
Total Sleep Period (Item 16 = Item 1+ Item 2)	Perception of the total time spent in bed attempting to sleep
3. Supplementation Scale - Perception of the degree to which the bulk sleep period was augmented with additional sleep time	
Daytime Sleep (Item 3)	Perception of time asleep other than primary sleep period
Morning Sleep (Item 4)	Perception of amount of supplemental sleep during the morning hours
Afternoon Sleep (Item 5)	Perception of amount of supplemental sleep during afternoon hours
Wake after Final Arousal (Item 13)	Perception of the time spent in bed from initial morning arousal to final awakening

* Translation from the personal correspondence of Snyder-Halpern R, Verran JA. Visual Analog Sleep (VAS) Scales (1990)

The instrument can be self administered with a completion time of five to ten minutes. Each item consists of two statements with opposite meanings located at the ends of a 100-mm. line. Respondents are requested to answer the items by putting a vertical mark on the line between the statement pairs at a point that best reflects their opinion about them. They are also requested to answer in terms of last night's sleep. A "night's sleep" is considered to be the period from when the person tried to sleep until (s) was finally up in the morning, including mornings or afternoons before the assessment moment.

To score the answers, a transparency is made with 100-mm. lines, marked in 5 mm. increments. The left end of the line corresponds to 0mm. and the right to 100mm. The transparency is placed on top of the answer lines of each item in the completed instrument to obtain a numerical reading in millimeters. The score for item 16 is calculated by adding the scores of items 1 and 2. Items 7 and 15 are presented reversedly, which is why the score obtained when reading these items should be subtracted from 100 ($100-X_1$). The scores for each scale (Disturbance, Effectiveness and Supplementation) are obtained by adding the scores of the pertinent items. The higher the score, the greater the sleep Disturbance, Effectiveness or Supplementation. Adding up the scale scores is not recommended. Therefore, there is no total score for the three scales.

The instrument developers presented results of reliability and validity estimates in four samples: healthy adults in their usual sleep environment; adults with insomnia, also in their usual sleep environment, hospitalized adults in the United States and hospitalized adults in Taiwan. These results show *Theta* coefficients between 0.82 and 0.86 for the Disturbance Scale, between 0.72 and 0.81 for the Effectiveness Scale, and between 0.45 and 0.84* for the Supplementation Scale. The *Theta* coefficient is an internal consistency estimate, based on Factor Analysis results, and their values are similar to those produced through Cronbach's alpha[13].

METHOD

Adaptation of VAS Scales

The authors of the VAS Scales authorized the adaptation to Portuguese. The original instrument in English was translated to Portuguese by a professional translator. The obtained material was back-translated to English by a second professional translator, who was not familiar with the original instrument. The original and back-translated versions were compared by the authors of this study. Comments and suggestions were discussed with the two professional translators until a Portuguese version was defined for subsequent testing.

The Portuguese version was submitted to face validation by nine nurses who were graduate students, experienced in surgical patient care and participated in a course subject about the development and validation of measuring instruments. Experience in surgical patient care was defined because of the intention to obtain data from postoperative patients for the psychometric tests of the instrument adapted to Portuguese. After adjustments according to the face validation and a pretest on 20 patients, the items were formatted with a similar presentation to the original in order to collect data for the validity and reliability estimates.

Empirical procedures

After a favorable opinion from the Institutional Review Board, the adapted instrument was tested at the medical and surgical clinical units of a large private hospital in São Paulo city. Data were collected in June and July 2004. The convenience sample included 180 patients over 18, on the first postoperative day (PO), who could answer the instrument and who, after the researcher presented the study, agreed to participate and signed the free and informed consent term. The patients were invited to participate in the study and, if they agreed, they completed the instrument and a form with personal and clinical data, during the afternoon of the first PO. The obtained data refer to the night following the day they underwent surgery.

Data analysis

Data were analyzed through descriptive statistics and reliability and validity estimates. Reliability was estimated using Cronbach's alpha. The structures

* Personal correspondence of Snyder-Halpern R, Verran JA. Visual Analog Sleep (VAS) Scales (1990).

of the Disturbance, Effectiveness and Supplementation scales were studied with Factor Analysis, with previous definition of the number of components according to the original scale and *Varimax* rotation. Correlations between the Disturbance, Effectiveness and Supplementation scales were tested.

RESULTS

The sample included 180 patients, with a mean age of 39.3 (±12.3) years; 123 (68.3%) were women and 62.2% had finished or unfinished higher education. All patients were on the first PO of small and medium-dimension surgeries. The most frequent procedures were gynecological (38.8%), gastrointestinal (23.3%) and orthopedic (13.3%).

The VAS Scales adapted to Portuguese started to be called the *Escalas Visuais Análogas de Sono (EVA - Sono).*

Table 2 - Descriptive statistics of *EVA - Sono* item scores (n=180). São Paulo, SP, 2004

Items	Median	Mean	SD	95% CI	
1 Wake After Sleep Onset	20	29.6	25.1	25.9	33.3
2 Total Sleep Time	65	58	32.2	53.3	62.8
3 Daytime Sleep	40	40.1	33.9	35.1	45.1
4 Morning Sleep	10	34.1	35.8	28.8	39.3
5 Afternoon Sleep	47.5	46.4	38.9	40.7	52.1
6 Sleep Latency	25	34.9	32.3	30.2	39.7
7 Soundness of Sleep	65	59.2	34.6	54.1	64.1
8 Quality of Disturbance	37.5	42.2	35.4	37	47.5
9 Mid-Sleep Awakening	65	59.5	33.8	54.5	64.4
10 Quality of Latency	17.5	36.2	35.9	30.9	41.5
11 Movement During Sleep	40	42.7	36.1	37.4	48
12 Rest Upon Awakening	57	60.1	33.8	55.1	65.1
13 Wake After Final Arousal	55	51.9	36.8	46.5	57.4
14 Subjective Sleep Quality	55	56.2	35.6	50.9	61.5
15 Sleep Sufficiency Evaluation	60	55.8	37.6	50.3	61.3
16 Total Sleep Period	95	87.6	30.7	83.1	92.2

Items 1 to 15 could range from 0 to 100, and item 16 from 0 to 200, as it adds items 1 and 2. The range of the Disturbance Scale is from 0 to 700 (seven items), of the Effectiveness Scale from 0 to 600 (4 items plus item 16) and of the Supplementation Scale from 0 to 400 (4 items).

Scale reliability

In the scale correlation matrixes, no negative correlation was found. In the Supplementation Scale, item 13 presented low correlation with the other items, ranging from 0.02 to 0.20.

Table 3 - Reliability estimates of *EVA - Sono* (n=180). São Paulo, SP, 2004

Disturbance Scale	**Total Alpha = 0.80**		
Items	**Pearson***	**R2****	**Alpha excluding the item**
9. Mid-Sleep Awakening	0.68	0.51	0.74
1. Wake After Sleep Onset	0.56	0.35	0.77
11. Movement During Sleep	0.39	0.17	0.80
7. Soundness of Sleep	0.32	0.14	0.81
8. Quality of Disturbance	0.58	0.44	0.76
6. Sleep Latency	0.56	0.40	0.76
10. Quality of Latency	0.63	0.47	0.75
Effectiveness Scale	**Total Alpha = 0.78**		
Items	**Pearson***	**R2****	**Alpha excluding the item**
12. Rest Upon Awakening	0.54	0.41	0.75
14. Subjective Sleep Quality	0.69	0.64	0.70
15. Sleep Sufficiency Evaluation	0.59	0.46	0.74
2. Total Sleep Time	0.69	0.69	0.70
16. Total Sleep Period	0.31	0.56	0.82
Supplementation Scale	**Total Alpha = 0.63**		
Items	**Pearson***	**R2****	**Alpha excluding the item**
3. Daytime Sleep	0.52	0.45	0.48
4. Morning Sleep	0.43	0.22	0.53
5. Afternoon Sleep	0.55	0.41	0.44
13. Wake After Final Arousal	0.16	0.08	0.72

* between the item and the sum of other items' scores
** the item as dependent variable

Scale validity

Table 4 - Factorial analysis of the *EVA - Sono* (n=180). São Paulo, SP, 2004

Items - Disturbance Scale	**F1**	**F2**
9. Mid-Sleep Awakening	0.71	0,38
1. Wake After Sleep Onset	0.71	0,17
11. Movement During Sleep	0.24	0,67
7. Soundness of Sleep	0.08	0,84
8. Quality of Disturbance	0.74	0,16
6. Sleep Latency	0.74	0,10
10. Quality of Latency	0.80	0,13
Variance	**59.9%**	
Items - Effectiveness Scale	**F1**	**F2**
12. Rest Upon Awakening	0.81	0,06
14. Subjective Sleep Quality	0.89	0,18
15. Sleep Sufficiency Evaluation	0.82	0,14
2. Total Sleep Time	0.44	0,83
16. Total Sleep Period (item 1 + item 2)	-0.03	0,96
Variance	**79.6%**	
Items - Supplementation Scale	**F1**	**F2**
3. Daytime Sleep	0.89	-0,12
4. Morning Sleep	0.69	0,18
5. Afternoon Sleep	0.81	0,15
13. Wake After Final Arousal	0.08	0,99
Variance	**74.3%**	

Item 13 was excluded from the Pearson correlation tests between the scores of the *EVA- Sono*, the reasons for which will be detailed in the discussion. The results were: r = -0.684, $p<0.001$ for Disturbance

and Effectiveness; r=-0.021, *p*=0.777 for Disturbance and Supplementation and r=-0.015, *p*=0.836 for Supplementation and Effectiveness.

DISCUSSION

Disturbance Scale

The Disturbance scale produced a reliability coefficient of 0.80. Table 3 shows a low correlation between the total score and item 7 (Soundness of sleep) (*r*=0.32) and that, when considering item 7 as a dependent variable in a Multiple Regression, R^2 is also very low (0.14), which means that only 14% of this item's score variability is explained by the scores of the other items. Something similar occurs with item 11 (Movement during sleep), whose R^2 was 0.17, with this difference that the correlation coefficients with the other items were not as low as for item 7. The alpha coefficient of 0.80 would slightly improve if items 7 or 11 were excluded. However, as this improvement would be very small, items 7 and 11 were maintained. In three samples of patients and one of healthy people, the *Theta* coefficient of the Disturbance scale ranged between 0.82 and 0.86*, which shows that, in this study, this scale's internal consistency was compatible with the estimates obtained for the original scale.

The Factor Analysis with two components (Table 4) revealed that items 9, 1, 8, 6 and 10 are part of the same factor and that items 11 and 7 are correlated in a second factor. This analysis was expected to present a solution in which the second factor consisted of items 6 and 10, which did not occur. Despite the above indicated limitations, the Disturbance Scale was defined, like in the original, with seven items and the composition of the items, which in this study did not correspond to the original structured, should be verified in other samples.

Effectiveness Scale

The reliability estimate produced an alpha of 0.78, indicating good consistency among the items. The alpha would increase if item 16 were excluded (Table 3), although the improvement would be very small, which is why the decision was made to maintain it. In studies using the original instrument, the *Theta* coefficient ranged from 0.72 to 0.81**, which shows that the results of this study were compatible with those obtained with the original scale.

The Factor Analysis with two components (Table 4) explained almost 80% of the variance for the Effectiveness Scale. Items 12, 14 and 15 are part of one factor, while items 2 and 16 were grouped in a second factor. This can be explained by the fact that item 16 is the sum of items 1 and 2. The obtained solution reproduces the expected structure, as the sub-scales of this scale group items 12, 14 and 15 with respect to sleep quality and items 2 and 16 related to sleep duration. The Effectiveness scale in the adapted instrument contains five items, like in the original scale.

Supplementation Scale

Item 13 displayed low correlation with the other items, ranging between 0.02 and 0.20. Total alpha for the four items was 0.63. It is observed in Table 3 that the exclusion of item 13 would raise alpha from 0.63 to 0.72, which is a substantial increase. Item 13 ("After morning awakening, stayed awake/ After morning awakening dozed off and on") may not reflect hospitalized patients' reality, mainly that of surgical patients. In this study sample, patients were advised not to get up without nursing help. This may have required them to spend more time in bed after arousal, even without the need to sleep longer. Therefore, item 13 may not have contributed to assess Supplementation, explaining the behavior of the reliability estimate and factor solution, discussed below.

The Factor Analysis with two components for the Supplementation Scale (Table 4) explained almost 75% of variability. However, it is observed that, in this solution, item 13 is isolated from the others, with a load of 0.99. This result confirms the reliability result for item 13 and can be explained by the reasons mentioned above when discussing reliability.

In view of the reliability and factor analysis results, the decision was made to exclude item 13

* Personal correspondence of Snyder-Halpern R, Verran JA. Visual Analog Sleep (VAS) Scales (1990).
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for subsequent analyses. The Supplementation scale in the adapted instrument was defined with three items, instead of four like in the original. The *Theta* reliability coefficients for Supplementation found in research with the original instrument (4 items) were 0.45 for healthy persons, against 0.68 and 0.84 for insomniac and hospitalized patients*. The alpha value in our study (0.72) for the three-item Supplementation scale is a bit lower than for hospitalized patients with the original instrument. However, the comparison is limited by the different number of items. The hospitalized patient sample included 42% of hospitalizations due to clinical reasons. No information is available about the proportion of surgical patients, nor about assessments on the first day after surgery.

The inadequacy of item 13 can be specific for assessments on the first PO and include other situations in which patients, independently of their sleep Supplementation needs, have to stay in bed after arousal. Therefore, the inclusion of item 13 is recommended in studies with other samples, for the sake of a better understanding of its behavior in the Supplementation scale.

Correlations between *EVA - Sono*

The Disturbance Scale presented a negative, moderate and significant correlation (-0.68 $p<0.001$) with the Effectiveness Scale, which was expected and indicates the validity of the instrument. The correlation coefficients between the total scores of the Supplementation Scale (without item 13) and those of the other two scales (Disturbance and Effectiveness) were negative, indicating an inverse correlation. However, levels were low and without statistical significance. These results are consistent with the scales' theoretical definitions.

CONCLUSION

The internal consistency and structure analyses showed adequate psychometric properties for the adapted instrument. For the seven-item Disturbance Scale, Cronbach's alpha was 0.80, indicating good internal consistency. Like in the original, the Disturbance scale was defined with seven items and the composition of the items needs to be confirmed in other samples. The Effectiveness Scale maintains the five items of the original version, with a Cronbach's alpha of 0.78, which is adequate. One item was removed from the Supplementation Scale (item 13) to assess sleep on the first PO, resulting in three items with a Cronbach's alpha of 0.72.

Studies with other samples are needed for a better analysis of the behavior of item 13. The availability of the *EVA-Sono* permits assessing the sleep of hospitalized patients during the hospitalization period, favoring not only patient care, but also instruments for research about sleep problems of hospitalized patients and about interventions to relieve them.

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Recebido em: 3.8.2006
Aprovado em: 9.4.2007