

SHORT COMMUNICATION

VALIDATION OF THE POST-COVID-19 FUNCTIONAL STATUS SCALE INTO MEXICAN-SPANISH

Luis Antonio MORENO-TORRES , MD, PHD¹, and Carmelita Elizabeth VENTURA-ALFARO , MD PHD²¹Departamento de Fomento a la Salud, Instituto Mexicano del Seguro Social, Delegación Jalisco, Mexico²Departamento de Epidemiología, Instituto Mexicano del Seguro Social, Delegación Jalisco, Mexico**Aim:** To translate and validate the Post-COVID-19 Functional Status Scale into Mexican-Spanish.**Materials and methods:** A cross-sectional study was performed for transcultural validation of the Post-COVID-19 Functional Status Scale in people over 18 years of age, using the international guidelines for validation published by Beaton and Guillemin. Diagnostic and clinimetric validity tests were applied to the scale. Statistical analysis was performed with the statistical program R.**Results:** The scale was applied to 249 patients, obtaining a Cronbach's alpha of 0.84 for the structured interview, and 0.67 for the self-reported questionnaire. When comparing both tests, and considering the structured interview as the reference test, the self-reported questionnaire had a sensitivity of 86.2%, a specificity of 96.3%, and a negative predictive value of 95.8%.**Conclusion:** A practical and valid scale was obtained, in concordance with that published in the original version, which can be used in daily clinical practice and rehabilitation. The scale can be used to rapidly and adequately identify post-COVID-19 patients with alterations in functionality who could benefit from rehabilitation therapy.**Key words:** COVID-19; validation study; clinical evolution; rehabilitation research.

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To date, for cumulative cases reported up to 24 April 2021, the COVID-19 pandemic, caused by coronavi-

LAY ABSTRACT

After having COVID-19, many people live with limitations in their daily life. Doctors therefore need a tool to assess these limitations properly, and to be able to identify them at an early stage, in order to offer adequate rehabilitation.

rus SARS-CoV2, has spread to more than 192 countries, with 146,079,735 confirmed cases of COVID-19, including 3,096,110 deaths (1). In the Americas there have been 60,006,538 confirmed cases with 1,456,405 deaths (2); while in Mexico there have been 2,323,430 confirmed cases and 214,504 deaths (1).

In patients who have recovered from COVID-19, there is an impact on their physical, mental, and social health status, even in those patients with a mild disease presentation. Given the heterogeneity of presentation of COVID-19, with symptoms ranging from deterioration in pulmonary function, muscle weakness, fatigue, depression, and anxiety, to decreased quality of life, a scale was developed to measure the consequences beyond the disease (3).

The Post-COVID-19 Functional Status (PCFS) Scale focuses on limitations in daily activities and changes in lifestyle. The instrument was developed by a panel of international experts via Delphi analysis, with the objective of rapidly determining the functional status of patients who have had COVID-19 (3). The scale evaluates patients who require short- and long-term follow-up, with assessments at 4 and 8 weeks after discharge to monitor direct recovery, and at 6 months after discharge to assess functional limitations. The scale can be administered

through a structured interview and/or a self-reported questionnaire, depending on the research or clinical context (3).

To date, however, the PCFS Scale has not been translated and validated into Mexican-Spanish, which would make the instrument applicable in this context. A Spanish version of the scale has been developed in Chile (4), but it is not applicable in the context of Mexico, since the use of the Spanish language differs between these countries. The objective of this study was therefore to translate and validate the PCFS Scale into Mexican-Spanish.

MATERIALS AND METHODS

A cross-sectional study was conducted to perform transcultural validation of the PCFS Scale (3), using the international guidelines for validation published by Beaton (5) and Guillemin (6). An initial translation was performed by 2 professional bilingual translators from English to Mexican-Spanish, using a synthesis of translations, then a retro-translation by 2 independent translators, which was approved by a committee of experts in epidemiology and clinimetrics. A pilot test of the pre-final version was carried out with 40 people, obtaining a final version with adaptation and validation of the language. Details of the final scale are available at <https://osf.io/zarv6/> (7).

Both versions of the PCFS Scale (the structured interview and the self-reported questionnaire) were used in this study, and were applied to users of primary healthcare in a medical unit of the Mexican Social Security Institute (initials in Spanish: IMSS) in Jalisco Borough, Mexico. The PCFS Scale was applied via an interview to IMSS beneficiaries of age 18 years and over, with a history of having been diagnosed with COVID-19 with SARS-CoV2 infection confirmed by RT-PCR test. The structured interview and the self-reported questionnaire were applied to all patients, in order to test and to compare both versions. The interview and self-reported questionnaire were conducted at the time of discharge from hospital after the acute period of the disease, or between 4 and 8 weeks after discharge. All patients provided informed consent. The World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) (8) 12-item instrument was applied in order to measure the reproducibility of the PCFS Scale structured interview version. Sampling was intentional, as only patients confirmed by RT-PCR were sought, obtaining a final sample of 249 interviews. The study was authorized by the Ethics and Research Committee of the IMSS in Jalisco Borough, Mexico (registration number R-2020-1306-088).

Statistical analysis

Statistical analysis was performed using the statistical program R (9), for application of diagnostic and clinimetric validity tests to the instruments, such as the Cronbach's alpha test. The sensitivity and specificity of the self-reported questionnaire was also calculated compared with the PCFS Scale structured interview. Likewise, an exploratory analysis of the sociodemographic characteristics and scale results was carried out, assessing the difference between men and women.

RESULTS

The study population comprised 249 people diagnosed with COVID-19; 140 (56.2%) women and 109 (43.8%) men, age range 19–83 years, mean age (standard deviation (SD)) 45 years (SD 14.2, with no significant differences between women and men ($\chi^2=8.2699$, $p>0.05$). The detected functional grade on the post-COVID-19 functional scale was: grade 0=16.4% ($n=41$), grade 1=25.7% ($n=64$), grade 2=34.5% ($n=86$), grade 3=19.7% ($n=49$) and grade 4=3.6% ($n=9$).

The transcultural validation process was carried out based on the international guidelines published by Beaton (5) and Guillemin (6), obtaining a construct and criterion validity, which absorbs the test from the original version, as well as a discriminant validity by carrying out a pre- and post-COVID-19 comparison, which measures the consequences of the disease over time, and the sensitivity to change, by performing measurements at discharge, at 4 and 8 weeks, and at 6 months after discharge. A Cronbach's alpha of 0.84 was obtained in the structured interview, with a covariance between items of 0.0469. The self-reported questionnaire obtained a Cronbach's alpha of 0.67, with a covariance of 0.0537. When comparing the PCFS Scale structured interview version with the 12-item WHODAS 2.0 instrument a correlation coefficient of 0.83 was obtained, which indicates that this provides an adequate measurement of the degree of post-COVID-19 functionality.

Comparison of the 2 versions of the adapted PCFS Scale, using the structured interview as the reference test, found a prevalence of 23% of patients with significant functional limitation post-COVID-19, the self-reported questionnaire having a sensitivity of 86.2%, specificity of 96.3%, and negative predictive value of 95.8%. Hence, the instrument provides a screening test with good validity, since it eliminates patients with no functional limitation, and the test is stable for use in screening the patient population for those who require rehabilitation. The psychometric, and validation tests indicate that the Mexican-Spanish version of the scale is reliable and accurate, and it can thus be used routinely by health personnel as a screening test to determine the degree of post-COVID-19 functionality. Details of the translation and cultural adaptation of the scale are shown in **Table I**.

The structured interview enabled us to observe which symptoms patients presented when applying the scale, and found that fatigue, pain (in any location), headache, dyspnoea, cough and anxiety, are the most frequent post-COVID-19 symptoms; while, headache, cough, muscle weakness, pain (in any location), odynophagia and rhinitis were the most frequent symptoms in the acute phase of COVID-19 (see **Fig. 1**).

Table I. Original and final version of the Post-COVID-19 Functional Status (PCFS) Scale, translated and adapted culturally (Mexico 2020)

Original version	Mexican-Spanish version
0: No functional limitations No symptoms, pain, depression or anxiety	0: Sin limitaciones funcionales Sin síntomas, dolor, depresión ni ansiedad.
1: Negligible functional limitations All usual duties/activities at home or at work can be carried out at the same level of intensity, despite some symptoms, pain, depression or anxiety.	1: Limitaciones funcionales mínimas Todas las tareas/actividades habituales en casa o en el trabajo pueden realizarse con el mismo nivel de intensidad, a pesar de algunos síntomas, dolor, depresión o ansiedad.
2: Slight functional limitations Usual duties/activities at home or at work are carried out at a lower level of intensity or are occasionally avoided due to symptoms, pain, depression or anxiety.	2: Limitaciones funcionales leves Las tareas/actividades en casa o en el trabajo se realizan a un menor nivel de intensidad o se evitan en ocasiones debido a síntomas, dolor, depresión o ansiedad.
3: Moderate functional limitations Usual duties/activities at home or at work have been structurally modified (reduced) due to symptoms, pain, depression or anxiety.	3: Limitaciones funcionales moderadas Las tareas/actividades habituales en casa o en el trabajo han sido modificadas estructuralmente (reducidas) debido a los síntomas, el dolor, la depresión o la ansiedad.
4: Severe functional limitations Assistance needed in activities of daily living due to symptoms, pain, depression or anxiety: nursing care and attention are required.	4: Limitaciones funcionales severas Se requiere asistencia en actividades de la vida diaria debido a síntomas, dolor, depresión o ansiedad: se requieren cuidados y atención de enfermería.
Death	Muerte

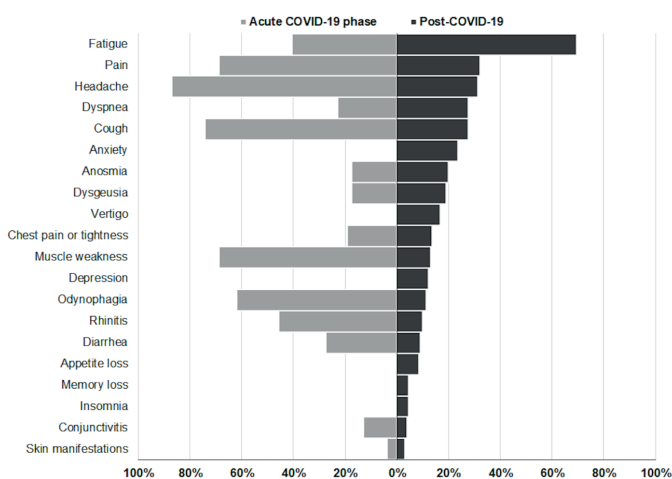


Fig. 1. Symptoms related to COVID-19.

DISCUSSION

These results are in concordance with those published for the original version of the PCFS Scale by Klok et al. (3); hence this is a valid instrument, with a similar Cronbach’s alpha, which determines its utility in clinical practice and research. An adequate validation process was performed, obtaining the criterion validity as well as the construct of the original version. In addition, the scale was compared with WHODAS 2.0, in order to obtain an adequate instrument for reference, since it measures quality of life. In addition the study determined the sensitivity and specificity of the PCFS Scale, which has not been described previously for this instrument.

Rehabilitation programmes help to treat symptoms, such as dyspnoea and anxiety, and to reduce complications, minimize disability, preserve function and improve quality of life. The PCFS Scale self-reported version provides a supportive tool for use alongside the standard instruments already in use in cardio-pulmonary rehabilitation services to treat post-hospitalized patients (10). It can be used as a screening test, to identify patients

who require assessment by the rehabilitation and cardiology specialties. The PCFS Scale structured interview version can be used to catalogue the patient with greater sensitivity and to determine the optimum treatment to mitigate the effects of COVID-19, including the functional repercussions.

The Stanford Hall consensus (11) for post-COVID-19 rehabilitation, makes several recommendations based on the best available evidence regarding rehabilitation in post-COVID-19 care, including general precautions and procedures regarding mitigation of contagion among the health personnel providing care. The availability of an instrument such as the PCFS Scale indirectly enables measurement of the patients’ degree of functionality, through a self-reported questionnaire, which provides extra support for clinical practice in primary healthcare, by streamlining assessments and reducing the time spent on medical practice.

CONCLUSION

This study developed a practical and valid Mexican-Spanish version of the PCFS Scale, which can be used by any healthcare professional in the context of post-COVID-19 rehabilitation, for use mainly in daily clinical practice (in primary healthcare) and to rapidly and properly discriminate as a screening test; the PCFS Scale self-reported version. The instrument can be applied in rehabilitation medical practice (in secondary and tertiary healthcare to observe changes during post-COVID-19 rehabilitation, at the time of hospital discharge (or at the start of rehabilitation), at 4 and 8 weeks and at 6 months after discharge, to measure progress in post-COVID-19 recovery, to establish a prognosis at an early stage, and to determine any secondary disability caused by COVID-19, which depends largely on the patient’s pulmonary and systemic condition. In addition, standardization of this functional assessment instrument across different departments and

rehabilitation services of different medical units will enable the comparison and assessment of medical care in order to improve patient care.

The authors report no conflicts of interest.

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