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Validation of online visual analogue scales in pulmonary fibrosis

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Background Visual analogue scales (VAS) are concise and may be patient-friendly alternatives for elaborate questionnaires (i.e. patient-reported outcome measures (PROMs)) to assess symptoms and general well-being, but have not been validated in pulmonary fibrosis (PF).

Aim To assess validity of VAS for dyspnea, cough, fatigue, and general well-being in patients with PF.

Methods Baseline data from patients with PF in the patient-led I-FILE registry [NCT04304898] were analyzed. VAS scores ranged from 0 to 10, with higher scores indicating greater severity. Correlations between VAS scores and anchors (lung function and validated PROMs) were calculated. Known-groups validity was assessed by comparing patients with and without long-term oxygen therapy (LTOT).

Results 395 patients from 7 European countries were included. Median age was 70 [64–75] years, 286 (72%) were male, and 207 (52%) had IPF. 306 (77.5%) completed all VAS. Symptom VAS scores correlated moderate to strong (r 0.63–0.76) with other PROMs. General VAS moderately correlated with other PROMs (r 0.48–0.62). All VAS scores correlated weakly with lung function (r 0.11–0.26). Patients on LTOT had significantly higher (worse) VAS scores ($p \leq 0.007$;table 1).

Conclusion Symptom and general VAS scores demonstrated good validity to assess symptom burden. This supports their complementary value besides lung function outcomes and provides an alternative to lengthy PROMs in clinical trials and care. We will further validate VAS scores on longitudinal data.

Table 1. VAS-anchor correlations at baseline and median VAS scores in patients with and without long-term oxygen therapy (LTOT)

	r at baseline	Median [IQR] LTOT (n=35)	Median [IQR] no LTOT (n=264)	p value
VAS dyspnea		6.75 [3.65-7.60]	2.10 [0.68-4.63]	<0.0001
FVC % pred	-0.20*			
DLco % pred	-0.26**			
L-PF dyspnea	0.76***			
K-BILD Breathlessness and activities	-0.76***			
VAS cough		4.10 [1.45-6.63]	1.50 [0.40-3.63]	0.0009
FVC % pred	-0.26***			
DLco % pred	-0.22*			
L-PF cough	0.77***			
LCQ	-0.76***			
VAS fatigue		5.85 [3.38-7.05]	2.60 [0.78-5.40]	<0.0001
FVC % pred	-0.12			
DLco % pred	-0.09			
L-PF energy	0.63***			
FAS	0.74***			
VAS general well-being		4.95 [1.28-5.10]	3.60 [3.28-6.23]	0.0065
FVC % pred	-0.13*			
DLco % pred	-0.11			
L-PF impacts	0.48***			
L-PF symptoms total	0.53***			
K-BILD total	-0.61***			
EQ-5D VAS	-0.62***			

VAS scores range from 0 to 10, with higher scores indicating greater impairment. The VAS general well-being score was converted in line with the other VAS for analysis.

Correlations are calculated using Spearman correlations. Group differences were tested with the Mann-Whitney U test. *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.
Abbreviations: DLCO, Diffusing capacity of the lungs for carbon monoxide; EQ-5D VAS, EuroQoL-5D Visual Analogue Scale; FAS, Fatigue Assessment Scale; FVC, Forced Vital Capacity; IQR, interquartile range; K-BILD, King's Brief Interstitial Lung Disease; LCQ, Leicester Cough Questionnaire; L-PF, Living with Pulmonary Fibrosis; LTOT, long-term oxygen therapy; VAS, Visual Analogue Scale.