

# Post-COVID-19 functional status: Relation to age, smoking, hospitalization, and previous comorbidities

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## Abstract:

**RATIONAL:** Recently, a new “Post-COVID-19 Functional Status (PCFS) scale” is recommended in the current COVID-19 pandemic. It is proposed that it could be used to display direct retrieval and the functional sequelae of COVID-19.

**AIM OF THE STUDY:** The aim of the study was to assess the PCFS and to evaluate if age, gender, smoking, hospitalization, and comorbidities have any effect on functional limitations in recovered COVID-19 patients.

**METHODS:** A total of 444 registered confirmed COVID-19 patients were included. They were interviewed in our follow-up clinics and filled an Arabic translated PCFS scale as well as their demographic and clinical data.

**RESULTS:** Eighty percent of COVID-19 recovered cases have diverse degrees of functional restrictions ranging from negligible (63.1%), slight (14.4%), moderate (2%), to severe (0.5%) based on PCFS. Furthermore, there was a substantial variance between the score of PCFS with age ( $P = 0.003$ ), gender ( $P = 0.014$ ), the duration since the onset of the symptoms of COVID-19 ( $P < 0.001$ ), need for oxygen supplementation ( $P < 0.001$ ), need for intensive care unit (ICU) admittance ( $P = 0.003$ ), previous periodic influenza vaccination ( $P < 0.001$ ), smoking status ( $P < 0.001$ ), and finally, the presence of any comorbid disorder ( $P < 0.001$ ).

**CONCLUSIONS:** Most of the COVID-19 recovered cases have diverse degrees of functional restrictions ranging from negligible to severe based on PCFS. These restrictions were affected by age, gender, periodic influenza vaccination, smoking, duration since symptoms onset, need for oxygen or ICU admittance, and finally the presence of coexisting comorbidity.

## Keywords:

COVID-19, post-COVID-19, post-COVID-19 functional scale, post-COVID-19 functional status, severe acute respiratory syndrome caused by coronavirus 2

Throughout history, there have been plenty of pandemics; however, the social response to COVID-19 is unparalleled. The world will certainly not be identical for a second time. It is assessed that almost 4 billion individuals are living in social

segregation during this mother of all pandemics.<sup>[1]</sup>

Initially described in China in December 2019, a severe acute respiratory syndrome caused by coronavirus 2 (SARS-CoV-2) has spread all over the world. Most countries are still grappling and some are struggling with the problem, nowadays there was

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proved, 20.6 million confirmed cases of COVID-19, as well as 749 K deaths worldwide.<sup>[2]</sup> Egypt reported slightly over 282,082 confirmed COVID-19 cases with 5085 deaths.<sup>[3]</sup> The new pandemic is injuring not only health organizations of several countries but also the financial prudence universal.

In the coming days, great stress will progressively comprise postacute carefulness of those recovered cases from COVID-19. It is expected that COVID-19 may have a principal effect on the physical, mental, cognitive, and public health state, similarly in cases with minor disease exhibitions.<sup>[4]</sup> Preceding outbreaks of coronaviruses have been concomitant with persistent impairment in pulmonary function, muscle weakness, pain, lethargy, depressed mode, anxiety, vocational disorders, and impaired quality of life to various grades.<sup>[5-7]</sup>

It is fundamental to have a simple measure to monitor the progression of symptoms and the effect of these symptoms on the functional state of the affected patients. Because of the enormous number of COVID-19 recovered cases that necessitate strong follow-up, a simple and reproducible measure to categorize those patients complaining from sluggish or partial recovery would aid in guiding the deliberate use of medical funds and will also standardize research efforts. Recently, a group of investigators recommended an ordinal scale for the evaluation of patient-relevant functional restrictions following an event of venous thromboembolism (VTE): the post-VTE functional status scale.<sup>[8,9]</sup> It covers the full spectrum of functional consequences and focuses on both restrictions in usual activities and alterations in lifestyle in 6-scale scores. It is already known that there is a great frequency of pulmonary embolism, myocardial injury/myocarditis, and neurological dysfunctions, in severely ill cases with COVID-19.<sup>[10,11]</sup> That's why Klok *et al.* designed their novel "Post-COVID-19 Functional Status (PCFS) scale" (after slight adaptation) to be valuable in the existing COVID-19 pandemic.<sup>[12]</sup> The recommended new scale could be used upon hospital discharge, at 4–8 weeks after-discharge to display direct rescue, and at 6 months to evaluate functional residue.

The aim of this work is to assess the PCFS in Egypt by the PCFS scale and to evaluate if age, gender, and comorbidities have any effect on functional limitations.

## Methods

During the period from July 15 to August 13, 2020, patients were included if they had confirmed COVID-19 in the registry of Ministry of Health and Population in Egypt (positive or indeterminate COVID-19 polymerase chain reaction test, or presumed presence of COVID-19 based on clinical and radiological criteria) from different

governorates. Patients were selected by consecutive sampling technique from home, hospital, or intensive care unit (ICU) treated registered cases. They were interviewed and asked to fill the survey forms. All responses were collected and revised for missing data. The original language of the questionnaire was English; it was translated to Arabic by Experts followed by back translation to English by other independent experts. Survey completion takes approximately 10 min. We recruited patients by consecutive sampling technique till the needed number of participant was achieved.

## Study design

The study design was a cross-sectional study.

## Sample size

Sample size was calculated using Epi info statistical package version 7 Centers for Disease Control and Prevention (CDC, USA. Based on the following parameters for cross-sectional study, expected post-COVID-19 cases 0.50, with acceptable margin of error 0.05, design effect 1, and 95% confidence level. The required sample size will be 384 patients. It will be raised to 425 after considering 10% as a dropout (number of cases in Egypt on 18<sup>th</sup> July 26, 2020 = 86474).

The following data were collected:

- The patient demographics and clinical data including age, gender, smoking status, residence, seasonal influenza vaccination, the presence of coexisting comorbidity quarantine status, oxygen supplementation, and history of ICU admittance history were recorded
- PCFS scale proposed by Klok *et al.*, 2020:<sup>[12]</sup> A questionnaire covering the entire range of functional limitations, including changes in lifestyle, sports, and social activities. If there was no limitation of activity, it was graded as Grade 0, if there was a negligible effect on activities for patients was considered Grade 1, whereas a lower intensity of the activities was considered as Grade 2. Grade 3 accounted for the inability to perform certain accomplishments, forcing patients to structurally modify these. Finally, Grade 4 was reserved for those patients with unembellished functional restrictions [Supplement 1]
- The study was approved by the ethical committee of Aswan Faculty of Medicine, Egypt and registered in Clinicaltrial.gov: NCT04479293.

## Statistical analysis

Data were coded and analyzed using the Statistical Package for the Social Sciences software program, version 26 (IBM SPSS 26 Statistics for windows, Armonk, NY: IBM Corp). Data was presented as range, mean, standard deviation, for quantitative variables and frequency and percentage for qualitative variables.

Comparison for qualitative variables was performed using Chi-square, while for quantitative variables, the comparison was conducted using One-way ANOVA test,  $P \leq 0.05$  was considered substantially significant.

## Results

### Demographic and clinical features of the study sample

The study involved 444 participants. They were 192 males and 252 females, the mean age was  $33.09 \pm 12.09$  years, and the range was 18–86 years. Most cases (71.2%) resided in the urban areas versus (28.2%) lived in rural areas. Nearly 77.9% of participants were nonsmokers, 13.1% were active smokers, while 9% were former smokers. Around 25% of cases had comorbid disorders. The mean duration since the onset of their symptoms was  $35.31 \pm 18.75$  days, 75.7% were admitted in hospitals, 20.7% required oxygen therapy, while 13.5% needed ICU as shown in Table 1.

### Post-COVID-19 functional status scale

Most of participants (63.1%) had a trivial limitation in activities after recovery from COVID-19 (Grade 1), 14.1% had slight (Grade 2), 2.5% had moderate (Grade 3), and only 0.5% had severe functional limitation (Grade 4). Only 20% had no functional limitations (Grade 0) as shown in Table 2.

Regarding the association between both demographic and clinical features of study group and their PCFS, there was a substantial variance between the grade of functional activity limitation (based on PCFS score) with age ( $P = 0.003$ ), gender ( $P = 0.014$ ), the duration since COVID-19 symptoms onset ( $P < 0.001$ ), need for oxygen supplementation ( $P < 0.001$ ), ICU admission ( $P = 0.003$ ), seasonal influenza vaccination ( $P < 0.001$ ), smoking status ( $P < 0.001$ ), and finally the presence of any comorbid disorders ( $P < 0.001$ ) [Table 3].

## Discussion

During the pandemic of COVID-19, we have been encountered with an enormous proportion of cases with diverse clinical features such as cough, fever, shortness of breath, musculoskeletal (lethargy and joint ache), gastrointestinal, and sleep disorders.<sup>[13-15]</sup> However, evidence is missing on the functional state after recovery. As far as we know, this is the first report to assess the persistent restrictions of functional activity among convalescent COVID-19 cases using the recommended PCFS. We found that 80% of COVID-19 recovered cases have diverse degrees of functional restrictions ranging from negligible (63.1%), slight (14.4%), moderate (2%), to severe (0.5%) based on PCFS. Furthermore, there was a substantial variance between the score of PCFS with age ( $P = 0.003$ ), gender ( $P = 0.014$ ), the duration since

**Table 1: Demographic and clinical characteristics of COVID-19 recovered cases included in the study (n=444)**

Variable	Frequency, n (%)
Age (years), mean±SD (range)	33.09±12.09 (18-86)
Gender	
Male	192 (43.2)
Female	252 (56.8)
Residence	
Urban	316 (71.2)
Rural	128 (28.8)
Smoking status	
None	346 (77.9)
Active	58 (13.1)
Former	40 (9.0)
Presence of any comorbidity*	
Yes	111 (25.5)
No	333 (75.0)
Seasonal influenza vaccination	
Yes	44 (9.1)
No	400 (9.9)
Duration since symptoms onset (days), mean±SD (range)	35.31±18.75 (10-120)
Quarantine status	
Hospital	114 (25.7)
Home	330 (74.3)
Oxygen supplementation	
Yes	92 (20.7)
No	352 (79.3)
Intensive care unit admission	
Yes	60 (13.5)
No	384 (86.5)

\*Cardiovascular disorder chronic heart disease, atrial fibrillation, heart failure, stroke, hypertension), endocrine disorders (diabetes mellitus, thyroid disease), kidney disorders, chronic obstructive pulmonary disease, active cancer, immune disorders. SD=Standard deviation

**Table 2: Post-COVID-19 Functional Status Scale in the studied recovered COVID -19 cases (n=444)**

Variable	Frequency, n (%)
No limitation (Grade 0)	89 (20.0)
Negligible limitation (Grade 1)	280 (63.1)
Slight limitation (Grade 2)	64 (14.4)
Moderate limitation (Grade 3)	9 (2.0)
Severe (Grade 4)	2 (0.5)
Total	444 (100.0)

the onset of the symptoms of COVID-19 ( $P < 0.001$ ), need for oxygen supplementation ( $P < 0.001$ ), ICU admission ( $P = 0.003$ ), previous periodic influenza vaccination ( $P < 0.001$ ), smoking status ( $P < 0.001$ ), and finally the presence of any comorbid disorders ( $P < 0.001$ ).

These results are not surprising as, in addition to the impairment in physical activities, the long duration of confinement and the extreme doubt during the COVID-19 disease had generated remarkable mental and attitude disorders.<sup>[16]</sup>

**Table 3: Association between demographic and clinical characteristics and post COVID-19 Functional Status Scale in the studied recovered COVID-19 cases (n=444)**

Variable	Grade 0, n (%)	Grade 1, n (%)	Grade 2, n (%)	Grade 3, n (%)	Grade 4, n (%)
Age (years)					
Mean±SD	30.06±10.28	33.11±11.73	36.62±14.12	37.33±18.35	32.50±6.36
P			0.003 <sup>#</sup>		
Gender					
Male	50 (26.0)	120 (62.5)	19 (9.9)	2 (1.0)	1 (0.5)
Female	39 (15.5)	160 (63.5)	45 (17.9)	7 (2.8)	1 (0.4)
P			0.014 <sup>##</sup>		
Residence					
Urban	59 (18.7)	212 (67.1)	38 (12.0)	6 (1.9)	1 (0.3)
Rural	30 (23.4)	68 (53.1)	26 (20.3)	3 (2.3)	1 (0.8)
P			0.069		
Duration since symptoms onset in days					
Mean±SD	38.87±17.69	34.52±19.01	33.67±17.79	38.89±26.00	25.00±14.14
P			<0.001 <sup>#</sup>		
Quarantine status					
Hospital	17 (14.9)	76 (66.7)	17 (14.9)	3 (2.6)	1 (0.9)
Home	72 (21.8)	204 (61.8)	47 (14.2)	6 (1.8)	1 (0.3)
P			0.516		
Oxygen supplementation					
Yes	0	70 (76.1)	19 (20.7)	2 (2.2)	1 (1.1)
No	89 (25.3)	210 (59.7)	45 (12.8)	7 (2.0)	1 (0.3)
P			<0.001 <sup>##</sup>		
Intensive care unit admission					
Yes	2 (3.3)	42 (70.0)	14 (23.3)	1 (1.7)	1 (1.7)
No	87 (22.7)	238 (62.0)	50 (13.0)	8 (2.1)	1 (0.3)
P			0.003 <sup>##</sup>		
Seasonal influenza vaccination					
Yes	89 (22.3)	280 (70.0)	31 (7.8)	0	0
No	0	0	33 (75.0)	9 (20.5)	2 (4.5)
P			<0.001 <sup>##</sup>		
Smoking status					
None	80 (23.1)	214 (61.8)	47 (13.6)	4 (1.2)	1 (0.3)
Active	9 (15.5)	30 (51.7)	16 (27.6)	2 (3.4)	1 (1.7)
Former	0	36 (90.0)	1 (2.5)	3 (7.5)	0
P			<0.001 <sup>##</sup>		
Presence of any comorbidity					
Yes	0	36 (32.4)	64 (57.7)	9 (8.1)	2 (1.8)
No	89 (26.7)	244 (73.3)	0	0	0
P			<0.001 <sup>##</sup>		

<sup>#</sup>One-way ANOVA test, <sup>##</sup>Chi-square test. SD=Standard deviation

In accordance with current results, several patients in the convalescence phase of SARS suffered from restrictions in physical activity causing fluctuating grades of restrictions in their work-related, public, and vacation activities or circadian living activities.<sup>[17,18]</sup> It was found that the exercise capability and physical status of SARS recovered cases were considerably worse than that of normal publics after 6-month follow-up. The functional frailty seemed disproportionate to the degree of functional lung injury and may be associated with additional aspects such as muscle weakness.<sup>[19]</sup> It was concluded that recovered cases of SARS had outstanding defects identified with pulmonary function testing, with Diffuse Lung Capacity for carbon monoxide

(DLCO) aberrations up to 2 years after retrieval, along with the health-related quality of life deficit.<sup>[6]</sup> Finally, the long-standing hazardous properties of common enduring pain, lethargy, emotional stress, and troubled sleep after severe SARS led to the inability to return to dynamic effort for a minimum of 1 year after their acute disease.<sup>[20]</sup>

Similarly, the MERS convalescent cases also reported the ominously lower quality physical health for at least 14 months after infection start, also survivors who anticipated ICU admittance described the ominously minor inclusive quality of life than those with noncritical disease.<sup>[21]</sup>

In the present study, only 3% of cases necessitating ICU did not record any functional restriction and 93.3% had negligible to slight functional restriction (compared to 22.7% no restrictions and 75% negligible-slight functional restriction, in patients not admitted in ICU,  $P = 0.003$ ). It was recorded that patients who require intensive care admittance or even invasive mechanical ventilation are at great hazard for emerging postintensive care syndrome.<sup>[22]</sup> It is a usually detected phenomenon inside ICU recovered cases among the different age groups and often is described as protracted incapacity consequential to muscle dysfunction, lethargy, pain, and shortness of breath.<sup>[23]</sup>

It is recommended that the functional state could have predictive value for COVID-19 patients, as compromised physical activity was independently concomitant with worst consequences in hospitalized cases with community-acquired pneumonia, according to a recent prospective study.<sup>[24]</sup> The performance status may forecast 1-month death rates as well as the frequently used CRB-65 score (confusion, respiratory rate, blood pressure, and age  $\geq 65$ ) in patients with any bacteriological or viral pneumonia.<sup>[25]</sup> Hence, the incorporation of patients' functional status measurement into patient assessment may improve the prognostic ability of current risk classification systems to predict mortality from COVID-19 pneumonia.<sup>[26]</sup> The use of simple scales as suggested by Klok *et al.*<sup>[12]</sup> may be very important in the assessment and follow-up of functional status in this novel post-COVID-19 syndrome and may reduce its related morbidities.

Since March, 2020 reports indicated that the severity and outcome of COVID-19 pneumonia (SARS-CoV-2) is affected by patients age, gender, smoking, ICU admission, and previous comorbidities.<sup>[1,13,14,26,27]</sup> To the best of our knowledge, this is the first report of persistent effect of these factors on the functional status of COVID-19 after recovery. The exact mechanism is not yet explained.

### Limitations of the study

First, the lack of data of functional status before COVID-19 infection; second, the history of the symptoms both at the onset of COVID-19 and after recovery is not included; third, the pharmacologic therapy given to the patients was not mentioned (however, all patients received the standard protocol of Ministry of health and population in Egypt, but it was changed several times according to international recommendations), finally, random selection bias may be present and an inability for personal face-to-face interview in some cases.

### Conclusions

Most of COVID-19 recovered cases have different degrees of functional limitations ranging from negligible

to severe based on PCFS. These limitations were affected by age, gender, periodic influenza vaccination, smoking status, duration since symptoms onset, need for oxygen therapy or ICU admittance, and finally the presence of coexisting comorbidity.

It is recommended that post-COVID-19 monitoring programs should be implemented in specific clinical settings or as an outpatient program to follow the functional status of patients in 1, 3, and 6 months visits to support the complete care for cases recovered from COVID-19. Furthermore, extended monitoring using simple scales as PCFS is necessary to determine whether these functional deficits after COVID-19 recovery persist or not. Further studies are required to explain the underlying cause of post-COVID-19 functional limitation.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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## Supplement File

Supplement 1: Ordinal scale for functional status manual to the post-COVID-19 functional status scale v2 20200710

### POST-COVID-19 FUNCTIONAL STATUS SCALE MANUAL

Version 2, July 2020

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## **Manual to the Post-COVID-19 Functional Status Scale for physicians and study personnel – including corresponding structured interview and assessment tools**

### **Introduction**

Post-acute care of patients with Coronavirus disease 2019 (COVID-19) will become particularly relevant after having addressed the surge of infections in the acute care settings. It is anticipated that an infection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) may have a major impact on physical, cognitive, mental and social health status in the long run, also in patients with mild disease presentation. Given the heterogeneity of COVID-19 in terms of clinical and radiological presentation, it is pivotal to have a simple tool to monitor the course of symptoms and their impact on the functional status of patients. An easy and reproducible instrument to identify those patients suffering from slow or incomplete recovery would help guiding pondered use of medical resources and will also standardize research efforts.

### **A scale to quantify current functional outcome in COVID-19 patients**

The post-COVID-19 functional status (PCFS) scale (**Table 1**) focuses on relevant aspects of daily life during follow-up after the infection. The scale is intended to help users becoming aware of current functional limitations in COVID-19 patients, whether or not as a result of the specific infection, and to objectively determine this degree of disability. As such, the scale is not meant to replace other relevant instruments for measuring quality of life, tiredness or dyspnoea, but is developed to use as an additional tool for evaluating the ultimate consequences of COVID-19 on functional status. This will aid in demarcating effective and ineffective COVID-19 therapies on functional outcomes in an experimental setting, as well as pave the road for value-based healthcare.

Recently, our group proposed an ordinal scale for assessment of patient-relevant functional limitations following an episode of venous thromboembolism (VTE): the post-VTE functional status (PVFS) scale (Boon GJAM et al. 2020, *Thromb Res*; Klok FA et al. 2019, *Thromb Res*). This scale was



developed after literature review and discussion with both international experts via a Delphi analysis and with patients via focus groups. As a result, good-to-excellent inter-observer agreement of scale grade assignment between self-reported values and independent raters was achieved. A slightly adapted scale for COVID-19 could be of great use to determine functional recovery, beyond binary outcomes such as mortality, in these patients (Klok et al. 2020, ERJ).

### **General Instructions**

#### *Characteristics of the PCFS scale*

The scale is ordinal, has 6 steps ranging from 0 (no symptoms) to 5 (death, D), and covers the entire range of functional outcomes by focusing on limitations in usual duties/activities either at home or at work/study, as well as changes in lifestyle. The scale grades are intuitive and can easily be grasped by both clinicians and patients.

#### *Timing*

The post-COVID-19 functional status is intended to be assessed 1) at the time of discharge from the hospital, 2) in the first weeks after discharge to monitor direct recovery, e.g. at 4 and 8 weeks post-discharge, and 3) 6 months after a COVID-19 diagnosis to assess the degree of persistent disability. Providing a reference value (pre-COVID-19 grade) is optional and will allow to measure the change in status. To measure this pre-COVID-19 functional status, the functional status assessment should refer to the status 1 month prior to the infection. While inquiring the patient on the pre-COVID-19 grade, it is recommended to ask multiple questions to ascertain the change in functional outcome. Assessment of the pre-COVID-19 functional status should be preceded by the first assessment of the current functional status.

#### *Procedure*

The post-COVID-19 functional status scale can be assessed by either medical experts or trained interviewers during a short structured interview, or may be self-reported by the patient. Assigning the

appropriate PCFS scale grade by the patient him or herself can be done by using the patient questionnaire (Table 2) and a simple flowchart (Figure 1). In the setting of clinical trials, using the structured interview is recommended as it is designed to further reduce subjectivity and bias between raters.

For any type of data collection, raters are encouraged to base their assessments on the *ability* of the patient to perform the activity rather than whether the patient actually performs the activity currently. This prevents overestimation of the severity of symptoms in patients who have chosen to abandon or who simply never performed certain activities in the course of a COVID-19 diagnosis.

#### *General description of each scale grade*

Grade 0 reflects the absence of any functional limitation. Grades 1 and 2 correspond to a condition for which usual duties/activities could be carried out, defined as any activity that patients undertake on a monthly basis or more frequently, either at home or at work/study. Importantly, this includes sports and social activities. Specifically, *Grade 1* is reserved for patients with some symptoms, which however do not prohibit or limit doing any usual activities. Grade 2 is reserved for patients who are able to independently perform all usual activities but at a lower intensity, sometimes combined with mild limitations in participation in usual social roles.

*Grade 3* accounts for moderate functional limitations that force patients to structurally modify usual activities, reflecting the inability to perform certain activities which, therefore, need to be taken over by others. Those patients may require assistance in instrumental activities of daily living (iADL), e.g. managing basic household chores, community mobility, shopping for groceries or necessities, or participation in usual social roles is restricted.

*Grade 4* describes those patients with severe functional limitations who require assistance with activities of daily living (ADL), not necessarily administered by a certified nurse. It should be indicated that assistance with some ADL activities, e.g. using the toilet, managing routine daily hygiene and functional mobility, is essential. Participation in usual social roles is likely restricted.

The death of a patient is recorded in grade D, and is mainly relevant in the setting of clinical research and quality control.

#### **Structured interview to the post-COVID-19 functional status scale**

The structured interview in the setting of clinical trials facilitates the objective assignment of patients to scale grades. Information should be ideally obtained primarily from the patient and/or a close friend or caregiver (proxy) who is familiar with the daily routine of the patient. If the patient lacks insight into some questions or if responses are inconsistent, it may be helpful to interview a caregiver or relative independently. The standardized questions cover 5 sections corresponding to the separate levels of disability (Table 1). However, it is encouraged to ask questions beyond those stated to ensure that the patient has grasped the meaning of the question and to further clarify their responses. Additionally, it is recommended to adapt the interviewing strategy according to the patient's status and his/her answers. Open questions can be a great way to start the interview, during which some key information will be obtained useful to score the patients. Later, more targeted or even closed questions can help to make a clear distinction between adjacent grades.

**Table 1: The post-COVID-19 Functional Status (PCFS) Scale**

PCFS scale grade + description	Section of the structured interview
<p><b>0 No functional limitations</b> No symptoms, pain, depression or anxiety.</p>	Symptom checklist
<p><b>1 Negligible functional limitations</b> 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.</p>	Symptom checklist
<p><b>2 Slight functional limitations</b> 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.</p>	Participation in usual social roles <i>(independently able to perform all duties/activities, even if occasional adjustment in tempo or frequency is needed)</i>
<p><b>3 Moderate functional limitations</b> Usual duties/activities at home or at work have been structurally modified (reduced) due to symptoms, pain, depression or anxiety.</p>	Instrumental ADL; participation in usual social roles <i>(inability to perform certain duties/activities which are taken over by others)</i>
<p><b>4 Severe functional limitations</b> Assistance needed in activities of daily living due to symptoms, pain, depression or anxiety: nursing care and attention are required.</p>	Constant care; basic ADL; instrumental ADL; participation in usual social roles
<p><b>D Death</b></p>	-

## Structured interview to the Post-COVID-19 Functional Status Scale

### INSTRUCTIONS

Please mark the appropriate boxes and respond to all questions. Check for consistency as you proceed, responses to later questions may suggest revision to earlier responses. Limitations or symptoms may vary over time, *the measurement concerns the average situation of the past week (except for when assessed at discharge, in that case it concerns the situation of the day of discharge).*

The corresponding PCFS scale grade is provided in the column besides each specific response. In case two grades seem to be appropriate, the patient will be assigned to the highest grade with the most limitations.

### SCALE ASSESSMENT

<i>Name / ID patient</i>	
<i>Date of COVID-19 diagnosis</i>	___ / ___ / _____
<i>Date of assessment of the PCFS scale</i>	___ / ___ / _____
<i>Setting</i>	At discharge <input type="checkbox"/> Outpatient visit at 4 weeks <input type="checkbox"/> Outpatient visit at 8 weeks <input type="checkbox"/> Outpatient visit at 6 months <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____
<i>Respondent(s)</i>	Patient <input type="checkbox"/> Patient and another person <input type="checkbox"/> Only another person <input type="checkbox"/> Specify _____
<i>Rater</i>	Physician <input type="checkbox"/> Study personnel <input type="checkbox"/>

STRUCTURED INTERVIEW

1. SURVIVAL	Corresponding PCFS scale grade if the answer is 'YES'
1.1 Has the patient died after the COVID-19 diagnosis?	D

2. CONSTANT CARE Explanation: meaning someone else needs to be available at all times. Care may be provided by either trained or an untrained caregiver. The patient will usually be bedridden and may be incontinent.	Corresponding PCFS scale grade if the answer is 'YES'
2.1 Do you require constant care?	4

<b>3. BASIC ACTIVITIES OF DAILY LIVING (ADL)</b> Explanation: assistance includes physical assistance, verbal instruction, or supervision by another person. It may be considered <i>essential</i> when there is a need for physical help (by another person) with an activity or for supervision, or the patient needs prompting or reminding to do a task. The need for supervision for safety reasons should be due to <i>objective danger</i> that is posed, rather than 'just in case'.	<b>Corresponding PCFS scale grade if the answer is 'YES'</b>
<b>3.1 Is assistance essential for eating?</b> (Eating without assistance: food and implements may be provided by others)	<b>4</b>
<b>3.2 Is assistance essential for using the toilet?</b> (Using toilet without assistance: reach toilet/commode; undress sufficiently; clean self; dress and leave)	<b>4</b>
<b>3.3 Is assistance essential for routine daily hygiene?</b> (Routine hygiene includes only washing face, doing hair, cleaning teeth/fitting false teeth. Implements may be provided by others without considering this as assistance)	<b>4</b>
<b>3.4 Is assistance essential for walking?</b> (Walking without assistance: if absolutely necessary, able to walk indoors or around house or ward, may use any aid, however not requiring physical help or verbal instruction or supervision from another person)	<b>4</b>

<b>4. INSTRUMENTAL ACTIVITIES OF DAILY LIVING (IADL)</b> Explanation: assistance includes physical assistance, verbal instruction, or supervision by another person. It may be considered <i>essential</i> when there is a need for physical help (by another person) with an activity or for supervision, or the patient needs prompting or reminding to do a task. The need for supervision for safety reasons should be due to <i>objective danger</i> that is posed, rather than 'just in case'.	<b>Corresponding PCFS scale grade if the answer is 'YES'</b>
<b>4.1 Is assistance essential for basic household chores which are important for daily life?</b> (E.g. preparing a simple meal, doing the dishes, take out the garbage; exclude chores that do not need to be done every day)	<b>4</b>
<b>4.2 Is assistance essential for local travel?</b> (Local travel without assistance: the patient may drive or use public transport to get around. Ability to use a taxi is sufficient, provided the patient can manage to call and instruct the driver)	<b>4</b>
<b>4.3 Is assistance essential for local shopping?</b> (The patient is not able to buy groceries or necessities by him or herself)	<b>3</b>



<b>5. PARTICIPATION IN USUAL SOCIAL ROLES</b>	<b>Corresponding PCFS scale</b>
Explanation: this section concerns impairment in fulfilment of major social roles (not social or financial circumstances).	<b>grade if the answer is 'YES'</b>
<p>5.1 Is adjustment essential for duties/activities at home or at work/study because you are unable to perform these yourself (e.g. resulting in a change in the level of responsibility, a change from full-time to part-time work or a change in education)?</p> <p>(Work refers to both paid employment and voluntary work. Special arrangements which allow someone to return to work, even though normally he/she wouldn't be able to work, should be considered as adjustment of work.)</p>	<b>3</b>
<p>5.2 Do you occasionally need to avoid or reduce duties/activities at home or at work/study or do you need to spread these over time (while you are basically able to perform all those activities)?</p>	<b>2</b>
<p>5.3 Can you no longer take good care of loved ones as before?</p> <p>(Taking good care includes babysitting, looking after your partner, parents, grandchildren or dependent others.)</p>	<b>3</b>
<p>5.4 Since the COVID-19 diagnosis, have there been problems with relationships or have you become isolated?</p> <p>(These problems include communication problems, difficulties in relationships with people at home or at work/study, loss of friendships (increase in) isolation, etc.)</p>	<b>3</b>
<p>5.5 Are you restricted in participating in social and leisure activities?</p> <p>(Comprising hobbies and interests, including going to a restaurant, bar, cinema, going for walks, playing games, reading books, etc.)</p>	<b>2</b>

<b>6. SYMPTOM CHECKLIST</b> Explanation: these can be any symptoms or problems reported by the patients or found on physical examination. Symptoms include but are not limited to: dyspnoea, pain, fatigue, muscle weakness, memory loss, depression and anxiety.	<b>Corresponding PCFS scale grade if the answer is 'YES'</b>
6.1 Do you report symptoms through which usual duties/activities need to be avoided, reduced or spread over time?	2
6.2 Do you report any symptoms, resulting from COVID-19, without experiencing functional limitations?	1
6.3 Do you have problems with relaxing or do you experience COVID-19 as a trauma? ('Trauma' is defined as: suffering from intrusive memories, flashbacks or avoidance responses, associated with having experienced COVID-19.)	1

**Assigning a grade on the post-COVID-19 functional status scale**

The overall rating is simply the poorest functional status indicated by the patient's answers (the highest grade corresponds with the most limitations). If a respondent has no limitations or symptoms, then the appropriate scale grade is 0.

<b>Final PCFS scale grade:</b> _____
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What was your PCFS scale grade *before* COVID-19? \_\_\_\_\_

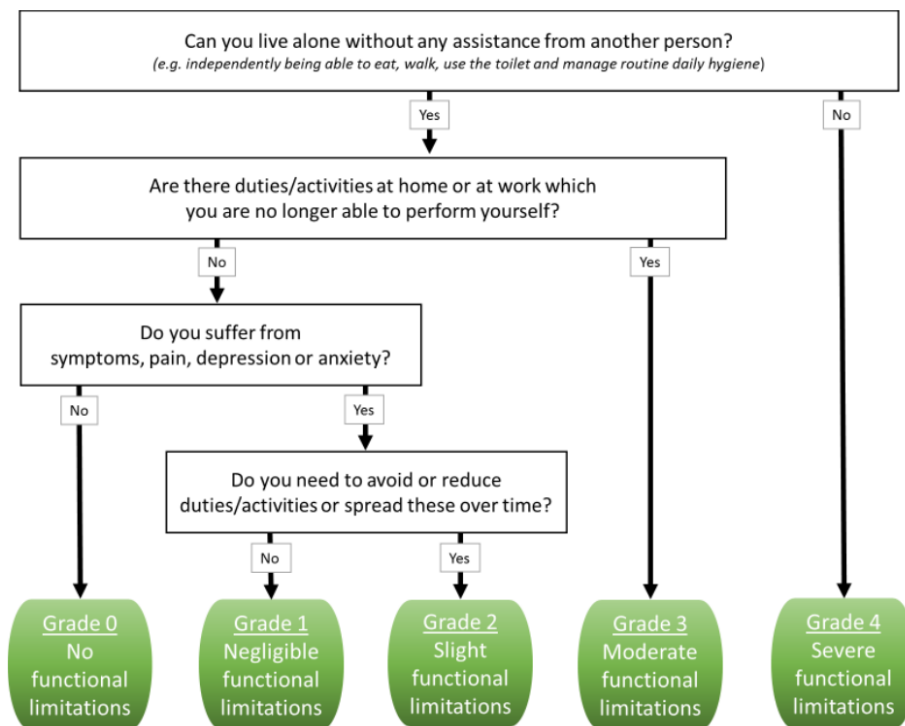
## **Measure the impact of COVID-19 on your life yourself: manual to the Post-**

### **COVID-19 Functional Status Scale for patients**

To indicate and discuss your current functional status, you can use the flowchart (**Figure 1**) and the patient questionnaire (**Table 2**), both belonging to the post-COVID-19 functional status scale. This PCFS scale covers the entire range of functional outcomes by focusing on limitations in usual duties/activities either at home or at work/study, as well as changes in lifestyle. Sports and social activities are also included in this. Limitations or symptoms may or may not be directly linked to COVID-19 and may have been present for a longer time period. They may vary over time, *the measurement concerns the average situation of the past week (except for when assessed at discharge, in that case it concerns the situation of the day of discharge).*

You can assign yourself to the appropriate PCFS scale grade by following the steps of the flowchart and by ticking the right box in the table. In case two grades seem to be appropriate, always choose the highest grade with the most limitations. Together with your treating physician you can coordinate when and how often you should measure your functional status. The treating physician will compare these results with normal recovery after the infection. In case of slow or incomplete recovery, the physician will indicate whether additional diagnostic tests are necessary, or treatment could be started.

Figure 1: Flowchart for patient self-report of the Post-COVID-19 Functional Status Scale



**Table 2:** Patient questionnaire for patient self-report of the Post-COVID-19 Functional Status Scale

How much are you currently affected in your everyday life by COVID-19? Please indicate which one of the following statements applies to you most. <i>Please tick only one box at a time.</i>	Corresponding PCFS scale grade if the box is ticked
I have no limitations in my everyday life and no symptoms, pain, depression or anxiety.	<input type="checkbox"/> 0
I have negligible limitations in my everyday life as I can perform all usual duties/activities, although I still have persistent symptoms, pain, depression or anxiety.	<input type="checkbox"/> 1
I suffer from limitations in my everyday life as I occasionally need to avoid or reduce usual duties/activities or need to spread these over time due to symptoms, pain, depression or anxiety. I am, however, able to perform all activities without any assistance.	<input type="checkbox"/> 2
I suffer from limitations in my everyday life as I am not able to perform all usual duties/activities due to symptoms, pain, depression or anxiety. I am, however, able to take care of myself without any assistance.	<input type="checkbox"/> 3
I suffer from severe limitations in my everyday life: I am not able to take care of myself and therefore I am dependent on nursing care and/or assistance from another person due to symptoms, pain, depression or anxiety.	<input type="checkbox"/> 4