SUPPLEMENT ONLINE

Post-COVID-19 dysfunctional breathing: a prospective cohort study

Supplemental methods

Telephone Assessment

Three to 4 months after hospital or ICU discharge, patients were contacted by telephone by a medical officer and administered a questionnaire that included general condition and respiratory, cognitive, and neurologic symptoms (with the Q3PC cognitive screening questionnaire). Patients were asked whether symptoms existed before they developed COVID-19. All symptoms were listed, without any interpretation. No psychological evaluation was performed.

In addition, patients with no history of chronic kidney disease and with high plasma creatinine levels (>1.47 mg/dL [130 μmol/L]) or estimated glomerular filtration rate less than 60 mL/min/1.73 m2 at hospital discharge were requested to have their serum creatinine levels reassessed. Patients were asked whether a lung CT scan had been performed after hospitalization, and if so, the lung CT scan was reviewed.

All ICU patients and those who were symptomatic were invited for further evaluation in the ambulatory setting. Symptomatic patients were defined as those reporting symptoms at the telephone interview (except for anosmia), all patients who had persistent creatinine-level elevation, and all those who had persistent abnormalities on a lung CT scan conducted after hospitalization (including any residual ground-glass opacities, bronchial or bronchioloalveolar abnormalities, lung condensations, or interstitial thickening).

Supplementary Table 1. Tests used for psychological, cognitive and respiratory assessment.

Test	Self-evaluation (Yes/No)	Symptom assessed	Best score	Worst score	Cut-off value
SF36 [1]	Yes	General health	0	100	None
BDI-13 [2]	Yes	Depression	0	39	>7
HADS-A [3]	Yes	Anxiety	0	21	>7
PCL-5 [4]	Yes	Post-traumatic stress	0	80	>30
ISI [5]	Yes	Insomnia	0	28	>7
MoCA [6]	No	Global cognitive functioning	30	0	<21 to <25
Mac NAIR [7]	Yes	Memory complaint	0	156	>54 to >66
d2-R [8]	No	Attention	135	65	<76
Nijmegen [9]	No	Dysfunctional breathing	0	64	>22

*BDI-13: Beck Depressive Inventory 13-item; HADS-1: Anxiety subscale of the Hospital Anxiety and Depression Scale; ISI: Insomnia Severity Index (ISI); MoCA: Montreal Cognitive Assessment; PCL-5: Post-traumatic Stress Disorder (PTSD) Checklist; SF-36: 36-item short-form health survey; * depends on age and educational level; ** depends on age; *** mean score is 100 with standard deviation of 15*

Supplementary Table 2. Modified Medical Research Council (mMRC) dyspnoea scale

Grade	Description of breathlessness
0	I only get breathless with strenuous exercise
1	I get short of breath when hurrying on level ground or walking up a slight hill
2	On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace
3	I stop for breath after walking about 100 yards or after a few minutes on level ground
4	I am too breathless to leave the house or I am breathless when dressing

References

1. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med. Care* 1992; 30: 473–483.

2. Aalto A-M, Elovainio M, Kivimäki M, Uutela A, Pirkola S. The Beck Depression Inventory and General Health Questionnaire as measures of depression in the general population: a validation study using the Composite International Diagnostic Interview as the gold standard. *Psychiatry Res.* 2012; 197: 163–171.

3. Spinhoven P, Ormel J, Sloekers PP, Kempen GI, Speckens AE, Van Hemert AM. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychol. Med.* 1997; 27: 363–370.

4. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *J. Trauma. Stress* 2015; 28: 489–498.

5. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Med.* 2001; 2: 297–307.

6. Nasreddine ZS, Patel BB. Validation of Montreal Cognitive Assessment, MoCA, Alternate French Versions. *Can. J. Neurol. Sci. J. Can. Sci. Neurol.* 2016; 43: 665–671.

7. Poitrenaud J, Kalafat M, Israel L, Guez D. [A critical review of available tools for evaluating memory enhancers in Alzheimer's disease]. *Rev. Med. Interne* 1997; 18: 59–71.

8. Brickenkamp R, Zillmer E. d2 Test of Attention, 1st edn. Hogrefe & Huber Publishers, Boston, 1998. .

9. van Dixhoorn J, Duivenvoorden HJ. Efficacy of Nijmegen Questionnaire in recognition of the hyperventilation syndrome. *J. Psychosom. Res.* 1985; 29: 199–206.