Pocket Guide for the assessment of post-COVID-19 condition (long-COVID) in underwriting and claims handling

NOT IF, BUT HOW

Munich RE

1 Introduction and definition of post-COVID-19 condition (long-COVID)

While SARS-CoV2-virus becomes endemic, there is a need within the Life and Health Insurance business for the evaluation of potential long-term effects of COVID-19. The impact of the syndrome called post-COVID-19 condition or long-COVID with a constellation of physical, cognitive, and psychological symptoms on underwriting (UW) and claims handling is unknown but could be substantial. Therefore, it is fundamental to understand this syndrome and its symptoms and accurately assess them. This paper is intended to help in the classification and evidence-based evaluation of post-COVID-19 symptoms and might serve as guidance for underwriting and claims handling.

The following current international consensus definition of the World Health Organization (October 2021) should be applied:

> "Post-COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time."

2 Practice-oriented approach for the assessment of relevant symptoms during underwriting and claims process

In the assessment of post-COVID-19 condition in UW and claims handling it is substantial to identify symptoms and to try to objectify these symptoms.

Post-COVID-19 condition is from our perspective a diagnosis of exclusion, which is in accordance with the WHO definition. Patients should be appropriately evaluated before reaching a final diagnosis to rule out other potential reasons for the reported symptoms. Depending on the kind and extent of symptoms, the medical work-up should include appropriate medical specialities and respective examinations.

In Figure 1 the most common post-COVID-19 symptoms are assigned to the respective medical specialty. Each medical specialty provides its analytical methods and examinations that might contribute to objectify these symptoms. In each medical disciplines a baseline assessment is first recommended. Further examinations (specific assessment) should be carried out in case of abnormalities or justified suspicion.

The recommended tools and parameters of the baseline assessment of each medical field are provided in Table 1. Which examinations are included in the specific assessment should be decided in each individual case by a specialist in the respective discipline.

Most patients with post-COVID-19 condition show a combination of symptoms, that are mutually dependent. Our approach deals with symptoms separately in different sections and represents a concise and easy-to-handle form. We recommend to focus on leading symptoms, that have presumably the largest impact on work ability.

Still, some symptoms are either not listed here or will remain un-objectifiable, despite all analytical efforts. For those cases it remains a similar challenge as for other diseases with unspecific symptoms and reduced objectifiability.

If you would like to learn more, we refer to our detailed article "Guidance for the assessment of post-COVID-19 condition during underwriting and claims handling". This offers a detailed description of the individual symptoms, their possible cause and the associated diagnosis.

Disclaimer: These recommendations could be subject to change. The long-term consequences of COVID-19 are under investigations. Definition of post-COVID-19 condition could change in the future.

Figure 1: Flow-chart of the most common symptoms in post-COVID-19 condition and their appropriate assessment. Regardless of the symptoms (first column, left), a medical history, physical examination and baseline laboratory testing is recommended. The symptoms can be assigned to different organ systems/specializations (second column). The medical specialties assigned to the symptom, recommend a first baseline assessment (third column). In case of abnormalities or justified suspicion, a further specific assessment should be carried out (fourth column).

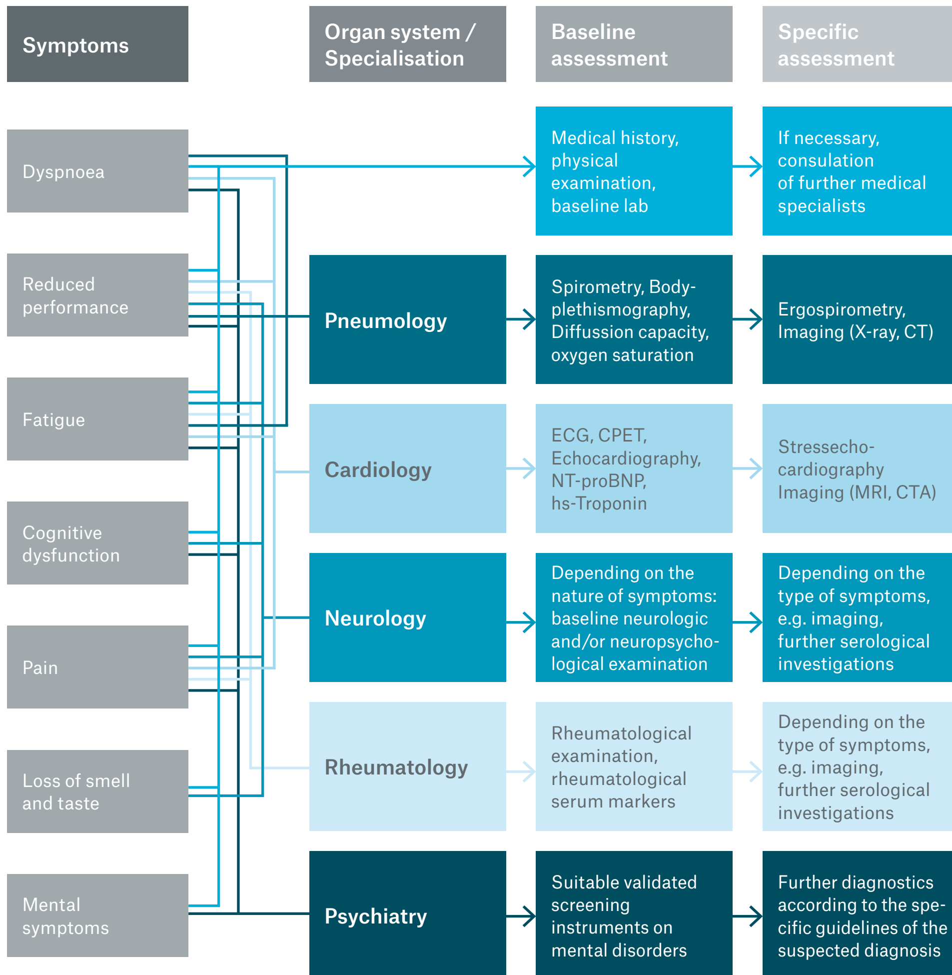


Table 1: List of recommended examinations for the assessment of post-COVID-19 condition. Order is by specialty and assigned symptoms.

Blood examinations

Blood values	Parameters		Conventional	SI-units
Blood count, electrolytes and renal function	Red cell count	Female	4.3–5.5million/mm³	4.5–6.0X10 12/l
		Male	4.5–6.0million/mm³	4.5–6.0X10 12/l
	White cell count		4,000–11,000/µL	4.0–11·10⁹/L
	Hemoglobin	Female	12–16 g/dL	7.5–9.9 mmol/L
		Male	14–18 g/dL	8.7–11.2 mmol/L
	Hematocrit	Female	40–48%	0.40–0.48
		Male	42–52%	0.42–0.52
	MCV			80–100 fl
	MCH		27–32 pg/RBC	1.7–2.0 fmol/cell
	MCHC		31–35 g/dL	19–22 mmol/L
	Red cell distribution width (RDW)		11.9–14.5%	0.119–0.145
	Glucose		70–100 mg/dl	3.9–5.6 mmol/l
	Calcium		8.5–10.5 mg/dl	2.2–2.6 mmol/l
	Sodium		136–152 mval/l	136–152 mmol/l
	Potassium		3.5–5.0 mEq/l	3.5–5.0 mmol/l
	Chlorid		95–105 mEq/l	95–105 mmol/l
	Blood urea nitrogen (BUN)		3.6–22 mg/dl	0.6–3.6 mmol/L
	Creatinine	Female	0.5–1.0 mg/dL	44–88 µmol/L
		Male	0.5–1.2 mg/dL	44–106 µmol/L
	Urinanalysis			
Liver function	ALT (GPT)	Female	≤ 35 U/L	≤ 0.60 µkat/L
		Male	≤ 50 U/L	≤ 0.85 µkat/L
	AST (GOT)	Female	≤ 35 U/L	≤ 0.60 µkat/L
		Male	≤ 50 U/L	≤ 0.85 µkat/L
	Alkaline phosphatase (ALP)	Female	35–104 U/L	0.58–1.74 µkat/L
		Male	40–129 U/L	0.67–2.15 µkat/L
	GGT	Female	≤ 40 U/L	≤ 0,67 U/L
		Male	≤ 60 U/L	≤ 1,00 U/L
	Bilirubin		≤ 1.2 mg/dL	≤ 20.52 µmol/L
	Albumin		3.1–4.3 g/dL	31–43 g/L
Inflammatory markers	CRP		≤ 5 mg/L	47.6 nmol/L
	Ferritin		13–200 ng/mL	29–449 pmol/L
	Erythrocyte sedimentation rate (ESR)	< age 50	15–20 mm/hr	
		≥ age 50	20–25 mm/hr	
Thyroid function	TSH		0.3–3.1 µU/ml	0.3–3.1 mU/l
	fT4		0.8–2.3 ng/dL	10.20–29.4 pmol/L
Vitamin deficiency	Vitamin D		40–80 ng/ml	100–200 nmol/L
	Vitamin B12		200–1000 ng/l	147.5–737.8 pmol/L

Organ system/ Medical discipline	Associated symptoms	Baseline assessment	Parameters/Tools	Normal values
Pulmonology	Dyspnoea, Reduced performance, Fatigue	Bodyplethys-mography	Total lung capacity (TLC)	6.0 to 8.0 L
			Specific airway resistance (sRaw)	Interpretation by pulmonologist
		Diffusing capacity[1]	Diffusing capacity of the lungs for carbon monoxide (DLCO)	> 75% of predicted value, up to 140%
		Oxygen saturation	Oxygen saturation	65–100 mmHg (8.7–13.3 kPa) [Male: 100–0.33 * age +/– 10 mmHg; Female: 98–0.32 * age +/– 10 mmHg]
Cardiology	Reduced performance, Dyspnoea, Fatigue	ECG		Evaluation by an experienced physician
		CPET	Maximum work load	Reference values depending on age, body weight and body height
		Echocardio-graphy[2]	Left ventricular ejection fraction (LV-EF)	≥ 50%
			Right ventricular function	Interpretion by a cardiologist
		Laboratory parameters	NT-pro-BNP	Female: ≤ 150 pg/mL (17.7 pmol/L)
				Male: ≤ 100 pg/mL (11.8 pmol/L)
			High sensitive-Troponin	< 14 ng/L (< 14 mcg/l)
Rheumatology	Fatigue, Pain, Reduced performance	Questionnaire	Connective Tissue Disease Screening Questionnaire	
			New Clinical Fibromyalgia Diagnostic Criteria	
			Fibromyalgie-Symptomfrage-bogen (german) or similar	
		Laboratory parameters	Interleukin 6	< 5 ng/l
			Tumor nekrosis factor (TNF) alpha	< 8.1 ng/ml
			Soluble interleukin 2-receptor	223–710 U/ml
			Antinuclear antibodies (ANAs)	< 1:160
			Rheumatoid factor (RF)	< 20 IU/ml
			Anti-cyclic citrullinated peptide antibodies (ACPA)	< 20 IU/ml
			Anti-cardiolipin antibodies (ACA)	< 10 U/ml
			Creatine phosphokinase (CPK)	Female: 26–192 U/l
				Male: 39–308 U/l

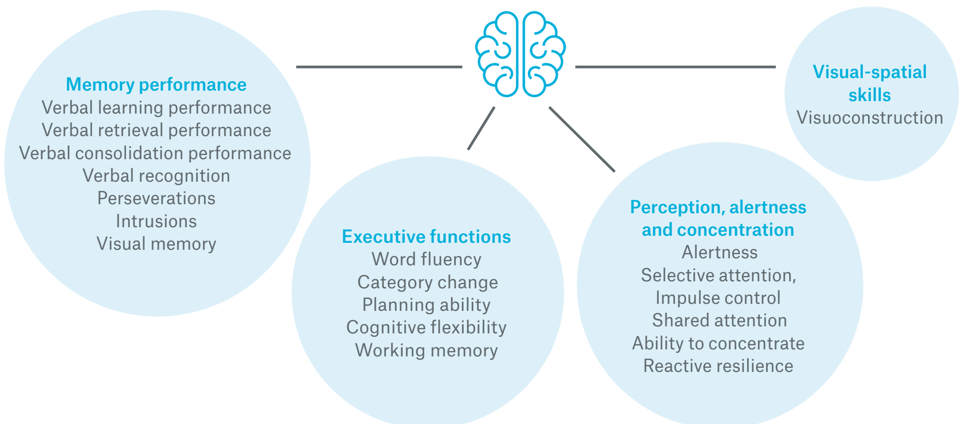
[1] Mild impairment: 60–75%
Moderate impairment: 40–60%
Severe impairment: < 40%

[2] Mild impairment: 40–49%
Moderate impairment: 30–39%
Severe impairment: < 30%

Organ system/ Medical Discipline	Associated symptoms	Baseline assessment	Parameters/Tools
Neurology	General	Questionaire	Neurobehavioral Symptom Inventory
	Fatigue	Questionnaire	Fatigue Severity Scale (FSS)
			Fatigue Scale (FS)
			Fatigue Assessment Scale (FAS)
			Wood Mental Fatigue Inventory (WMFI)
	Cognitive deficiency	Questionnaire	Montreal Cognitive Assessment (MoCA)
		Neuropsychological examination[1]	See Figure 2
	Pain	Questionnaire	Brief Pain Inventory
			New Clinical Fibromyalgia Diagnostic Criteria,
			Fibromyalgie-Symptomfragebogen (german) or similar
			Kieler Kopfschmerzkalender (german) or similar
			Neuropathic Pain Diagnostic Questionnaire (DN2)
	Loss of smell and taste	Standardized tests[2]	Sniffin' Sticks
			Smell Identification Test UPSIT
Psychiatry	Mental symptoms, Pain, Fatigue, Cognitive deficiency, Dyspnoea, Reduced performance	On suspicion of anxiety disorder	General Anxiety Disorder-7 (GAD-7)
			Hospital Anxiety and Depression Scale (HADS)
		On suspicion of depressive symptoms	Patient Health Questionnaire-9 (PHQ-9)
			Hospital Anxiety and Depression Scale (HADS)
		On suspicion of posttraumatic stress disorder (PTSD)	PTSD Symptom Scale (PSS)
			Screen for Posttraumatic Stress Symptoms (SPTSS)
			PTSD Checklist for DSM-5 (PCL-5)
			Impact of Event Scale-Revised (IESR)
		On suspicion of somatoform disorder	Screening für Somatoforme Störungen (SOMS)

[1] The neuropsychological examination is carried out by psychiatrists or neuropsychologists.
[2] These tests are also performed by ENT (ear, nose and throat) specialists.

Figure 2: Neuropsychological examination



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