RECOMMENDATIONS FOR THE CLINICAL MANAGEMENT OF CHILDREN AND ADOLESCENTS WITH POST-COVID-19 CONDITION IN CATALONIA

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Abbreviations

Abbreviation	Description
1 min STST	1 minute sit-to-stand test
6MWT	6 minute walking test
Ag	Antigen
ALT	Alanine amino-transferase
ANA	Antinuclear antibodies
Anti-TG	Anti-transglutaminase
ASLO	Antistreptolysin antibodies
AST	Aspartate amino transferase
Ax temp	Axillary temperature
BMI	Body mass index
BP	Blood pressure
CK	Creatine kinase
CMV	Cytomegalovirus
CRP	C-reactive protein
COVID-19	Coronavirus Disease 2019
CT	Computed tomography
CYMHS	Child and youth mental health service
EBV	Epstein-Barr Virus
ECG	Electrocardiogram
EEG	Electroencephalogram
ESR	Erythrocyte sedimentation rate
FACIT-F	Functional Assessment of Chronic Illness Therapy-Fatigue
FBC	Full Blood Count
FLACC	Face, Legs, Activity, Cry, Consolability scale
HR	Heart rate
HC	Hospital Care
JIA	Juvenile Idiopathic Arthritis
LABA	Long-lasting beta-agonists
LDH	Lactate dehydrogenase
MRI	Magnetic resonance imaging
mMRC	modified Medical Research Council
NRS	Numerical Rating Scale
NT-proBNP	N-terminal cerebral natriuretic propeptide
O2 sat	Oxygen saturation
ORL	Oto-rhino-laryngology
PedsQL	Pediatric Quality of Life Inventory
PC	Primary Care
PFAPA	Periodic Fever, Aphthous Stomatitis, Pharyngitis, Adenitis
PIMS-TS	Paediatric inflammatory multisystem syndrome temporally associated with COVID-19
POTS	Orthostatic postural tachycardia
PPI	Proton Pump Inhibitors
PSVT	Paroxysmal supraventricular tachycardia
QL	Quality of life
RF	Rheumatoid factor
RR	Respiratory rate
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SDQ	Strengths and Difficulties Questionnaire
SLE	Systemic lupus erythematosus
TSH	Thyroid-Stimulating Hormone
WHO	World Health Organization
X-ray	Radiography

1. Introduction

Coronavirus disease 2019 (COVID-19) occurs in most children and adolescents in a mild form. According to the series up to 50% can remain even asymptomatic. The most reported symptoms in the acute phase are fever, cough, rhinorrhea, odynophagia, headache, myalgia, abdominal pain, diarrhea, vomiting, anosmia and ageusia[1,2].

The clinical picture usually resolves in a week[2,3]. Very few cases require hospitalization (<2%) or die (<0.03%). Risk factors associated with severity are not yet well defined, mainly obesity, neurological disease with cognitive deficit (including Down syndrome), congenital heart disease, chronic respiratory disease (including asthma), immunosuppression and diabetes have been described. The main complication in the acute phase is pneumonia, which in some cases evolves into respiratory distress syndrome with respiratory failure. Another relevant problem is the multisystem inflammatory response syndrome associated with SARS-CoV-2 (known by the acronym SIM-PedS in Spanish and PIMS-TS or MIS-C in English). This rare condition (<0.1%), mainly affects children between the ages of 6 and 12 years and appears 2-6 weeks after acute infection. It presents with fever, abdominal pain with or without diarrhea and/or mucocutaneous manifestations similar to those of Kawasaki disease, and is complicated by myocarditis and cardiogenic shock. Around 8-14% have coronary aneurysms, most of them resolve after 90 days. Other complications described have been acute appendicitis, pancreatitis, hepatitis, encephalopathy or encephalitis, cerebral infarction or demyelinating disorders[3,4].

Post-COVID syndrome or Long COVID (in our environment also called persistent COVID-19), recognized by the World Health Organization (WHO) since September 2020 under the name of post-COVID-19 condition, has been documented in follow-up studies in adults, children and adolescents. The WHO defines it as the presence of signs and symptoms that develop during or up to 3 months after acute SARS-CoV-2 virus infection and that remain continuously or fluctuating for more than 8 weeks, without being able to be explained by alternative diagnoses[5]. It can also occur in patients in whom the infection was initially asymptomatic. A Delphi consensus by international experts and families has proposed defining this condition in the pediatric population as the presence of persistent symptoms for at least 12 weeks, not present before SARS-CoV-2 infection, not attributable to other known causes and that have a negative impact on daily life[6].

Although the post-COVID-19 condition in children and adolescents appears to be less common than in adults[7], the prevalence is not yet well defined. The majority of published studies in the pediatric population have been criticized for their limitations and heterogeneity in the definition and methodology used (lack of control group, low response rate to surveys, age of patients). This has led to the fact that while some authors seem to have obtained an overestimated figure, others have even questioned their existence. The prevalence estimates are between 1-2% in more rigorous studies that have included a control group of uninfected patients[4,8,9]. The emergence of more transmissible variants such as Omicron is not associated with more severe disease, and appears to produce fewer cases of patients with persistent symptoms[10, 11].

The pediatric post-COVID-19 condition is therefore a rare but real entity. Evidence of possible organic damage with pulmonary hypoperfusion in pulmonary SPECT or cerebral hypometabolism in PET of some patients has been reported, although the validity and interpretation of these findings is yet to be determined[12.13]. It especially affects adolescents of the female sex. Other possible associated risk factors are the history of allergy, obesity or other comorbidities, having required hospitalization or having had 4 or more symptoms in the acute phase of the infection[7.14]. Family clusters have been described[15]. The symptoms are similar to those described in adults. The most common symptom is both physical and mental fatigue, which can significantly affect the quality of life, limiting school and social activity. Dyspnea, chest pain, headache, sleep disorder, myalgia or autonomic nervous system disorder with tachycardia or orthostatic hypotension are also described, among other symptoms (see table in 1.3. Clinical manifestations)[7,8,14,16].

Early diagnosis of these cases is important to offer support (believe what they explain, accompany them), detect symptoms and signs of severity, rule out other diseases, review referral criteria and assess whether they require symptomatic and rehabilitative treatment.

Many patients can be followed up by the Primary Care pediatrician. The knowledge and comprehensive vision of the child, adolescent and their family, will allow the pediatrician to coordinate therapeutic strategies with different professionals to improve their quality of life. In pediatric age, this care is especially necessary since children and young people are in a stage of physical, cognitive and emotional development.

Persistent symptoms after COVID-19 in children and adolescents seem to improve over time, most recovering in 6-12 months[7,8,17]. This is relevant data to discuss with the patient and the family once the diagnosis is made.

Some studies in adults show a protective effect of vaccination against COVID-19 and post-COVID-19 condition[11], although there is no evidence of this effect in the pediatric population. It is also not clear whether giving antiviral treatment in the acute phase of the infection can reduce the risk of Long COVID. COVID-19 vaccination recommendations for patients with post-COVID-19 condition do not differ from those without post-infectious complications. There are indications that vaccination could help in the improvement or remission of the symptoms, but the evidence is limited[18].

The objective of this guideline is to make an adaptation for the pediatric population of post- COVID-19 condition management guidelines published for adults and review the recommendations given by professionals who look after children and adolescents with this problem[16,17,18]. It has been prepared by the Catalan Society of Pediatrics in collaboration with the Catalan Society of Physical Medicine and Rehabilitation, Child and Adolescent Psychiatry, the Group of Children, Adolescents and Families of the Collective affected by Long COVID and the COPEDI-CAT Research Group. The recommendations described below will be subject to updates according to the data provided by the scientific evidence.

1.1. Definition and description of the illness

In order to unify concepts, criteria and management, we define pediatric patients with post-COVID-19 condition as children **under 18 years of age diagnosed with COVID-19 and who, twelve weeks after infection, continue to present symptoms, without recovering their previous state of health.**

1.2. Pathophysiology

The pathophysiological mechanisms that cause post-COVID-19 condition are still unknown. Research studies in this field are needed in order to find therapeutic options. There are several theories regarding pathophysiology, highlighting a possible viral persistence, abnormal immune response, alteration in the intestinal microbiota or damage to the vascular endothelium with microthrombosis and platelet hyperactivation[9, 21,22].

1.3. Clinical manifestations

The clinical spectrum that can be seen with post-COVID-19 condition is very broad, due to the large number of symptoms described and the differences in severity and impact on patients' lives.

It should be noted that any situation that entails a change in the basal state of a person in a sustained way over time and with an uncertain prognosis, can have an emotional impact. An adequate assessment and accompaniment are necessary.

The different published studies show more than 200 symptoms, and they are similarly described in children, adolescents and adults[7,8,14,16]. Below are the most prevalent.

Group	Symptoms
Systemic	Asthenia, fatigue, fever, post-exertional malaise, weakness
Neurological	Difficulty concentrating, attention deficit, memory loss Paraesthesia, headache, vertigo, sleep disorders Anosmia, ageusia
Respiratory	Cough, dyspnoea
Cardiovascular	Chest pain, palpitations, tachycardia, low blood pressure, pre-syncope and syncope
Musculoskeletal	Myalgias, arthralgia
Psychiatric	Anxiety, depression
Gastrointestinal	Hyporexia, diarrhoea, vomiting, abdominal pain, dysphagia
Mucocutaneous	Urticaria, rash, pernio, mouth ulcers
ORL	Odynophagia, dysphonia, tinnitus

2. Anamnesis

It is necessary to perform a detailed anamnesis in the management of these patients, asking about current symptomatology, the date of onset and intensity, as well as the personal and family history of the patient.

2.1. Acute phase of SARS-CoV-2 virus infection

It is important to define how acute SARS-CoV-2 infection was, as well as its duration and microbiological confirmation.

Ask for:

- Date of symptoms onset
- Date and method of microbiological confirmation
- Symptomatology and duration
- Need for hospitalization
  - Date of admission and discharge
  - Treatment received
  - Need for oxygen therapy
  - Complications during admission
- Total days of confinement at home, whether contact with social circle and school has been able to be kept virtually, and whether physical activity has been kept while being at home

2.2. Present illness (persistent symptoms)

Try to describe in detail all the possible symptoms that the patient presents or may have presented in the time after the acute symptomatology of the infection. Ask also if they occur continuously, fluctuating or in flares.

It will be necessary to collect in each of the symptoms the frequency, duration, intensity, triggers or aggravating factors and the impact on quality of life. In this way, the need for investigations and treatment can be assessed.

Measuring the intensity or severity of symptoms

To measure the intensity or severity of some symptoms, it is recommended to use the following scales:

- Pain (FLACC, Wong-Baker or numerical, see Annex 1)
- Anosmia (numerical, see Annex 2)
- Fatigue (FACIT-F, see Annex 3)
- Dyspnoea (mMRC, see Annex 4)

2.3. Everyday life

It will be necessary to record and take into account the mood and capacity for activities of daily living that the patient presents.

It will be important to note:

- Inability to carry out basic daily activities normally (e.g., showering, combing, eating, walking, going up/down stairs...)
- Mood: worry, sadness, anguish... for not being able to perform the usual activities
- Schooling: ask if the patient has been able to continue with the usual schooling or has observed any impediment, how he/she tries to resolve it (the patient, the family and the school ...), if in general he/she has lowered the school performance and compare it to how it was prior to the infection
- Social life: evaluate if he/she tries to continue the relationship with friends / family, in person or through social networks....
- Family situation: with whom he/she lives, situations of stress/anxiety within the last months/year, loss of a family member/acquaintance...

Measuring the impact of symptoms on quality of life

To measure the overall impact of the disease on quality of life, it is recommended to use the PedsQL questionnaire (see Annex 5, 6, 7).

Psychopathology screening

For specific screening of psychopathology, the Strengths and Difficulties questionnaire (SDQ) can be used (see Annex 8, 9).

2.4. Background

Personal background

- Aspects of basal psychomotor development
- Aspects related to learning / schooling (pre-infection situation)
- Sleep habit
- Eating habit
- Depositional habit
- Usual physical activity
- Family dynamics and environment
- Vaccination schedule

Medical history

- Previous diseases
- Known allergies (eczema, asthma, allergic rhinitis, food or drug allergy)
- Previous hospital admissions
- Surgical interventions
- Follow-up by specialists
- Regular medications

Family history

- Family members with a history of SARS-CoV-2 infection (mild involvement, hospitalization, death)
- Family members with post-COVID-19 condition
- History of autoimmune diseases, fibromyalgia, chronic fatigue
- History of other diseases (cardiovascular, respiratory, mental health pathology...)

3. Physical exam

It will be necessary to perform a thorough physical examination, with vital signs being taken and a complete exam of body systems being done, both at the first visit and in subsequent controls, to evaluate the appearance of new conditions.

- Vital signs: axillary temperature, O2 saturation, blood pressure, heart rate, respiratory rate
- Weight and height
- Physical exam:
  - Skin and mucous membranes
  - Cardiopulmonary auscultation
  - Abdominal examination
  - Osteoarticular evaluation
  - ORL exam if there are symptoms
  - Neurological examination

Assessment of functional or exercise capacity

Functional o exercise capacity can be assessed by 1 minute sit-to-stand test (see Annex 10).

Muscle strength assessment

The strength of the upper and lower extremities can be measured with the manual muscle test that follows the Medical Research Council grading scale (MRC, see Annex 11).

Evaluation of the presence of orthostatic hypotension or orthostatic tachycardia

The presence of orthostatic hypotension or orthostatic postural tachycardia can be assessed by doing the active stand test (see Annex 12).

4. Investigations

The diagnosis of post-COVID-19 condition is a diagnosis of exclusion, so it is essential to make an adequate differential diagnosis to rule out other diseases (see Annex 13).

At the first visit, after considering that we are dealing with a patient with probable post-COVID-19 condition and depending on the symptomatology, it is recommended to request the following diagnostic tests:

- Blood tests: full blood count, ESR, CRP, ferritin, vitamin B12, folic acid, TSH, proteins, albumin, glucose, renal profile (creatinine, electrolytes), lipid profile, liver profile (AST, ALT), vitamin D25OH, LDH, CK (compare with previous blood tests if they were taken in the past).

  In some cases, the following can also be requested: cortisol (if fatigue or cognitive dysfunction), ANA and RF (if arthralgias, persistent fever or mucocutaneous manifestations), D-dimer (if chest pain or dyspnoea), troponin T and NT-proBNP (if fatigue, chest pain or dyspnoea)

- ECG
- Chest X-ray if respiratory symptoms (cough, chest pain, dyspnoea), fatigue or persistent fever
- Lung, abdominal, joint ultrasound if necessary
- Spirometry if respiratory symptoms (cough, chest pain, dyspnoea) or fatigue

The investigations derived from each symptom are not mandatory, they depend on the individualized medical assessment.

	Fatigue	Cognitive	Headache	Anosmia	Arthralgia	Myalgia	Chest pain	Dyspnoea	Cough	Palpitations	Dizziness	Digestive	Mucocutaneous	Fever
Full blood count	Yes	Yes			Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes
ESR, CRP	Yes	Yes			Yes				Yes			Yes	Yes	Yes
ferritin	Yes	Yes						Yes		Yes	Yes	Yes	Yes	Yes
Vit B12, folic acid	Yes	Yes										Yes	Yes	
TSH	Yes	Yes									Yes	Yes	Yes	Yes
Proteins, albumin	Yes	Yes										Yes		Yes
Glucose	Yes	Yes										Yes		Yes
Renal (creatinine, Na, K)	Yes	Yes									Yes	Yes		Yes
Liver (AST, ALT)	Yes	Yes										Yes		Yes
Vit D25OH	Yes											Yes		
LDH	Yes				Yes									Yes
CK	Yes					Yes								
Cortisol 8h	Yes	Yes												
IgA anti-TG	Yes											Yes	Yes	
Immunoglobulins	Yes								Yes			Yes	Yes	Yes
Lipase												Yes		
D-dimer							Yes	Yes						
Troponin T, NT-proBNP	Yes						Yes	Yes						
Serologies	Yes				Yes								Yes	Yes
ANA, RF					Yes	Yes							Yes	Yes
ASLO					Yes									
Abdominal ultrasound												Yes		Yes
Stool culture												Yes		Yes
Stool parasites test												Yes		
Stool *H. pylori* Ag test												Yes		
Calprotectin												Yes		Yes
Digestive endoscopy												Yes		
Urine sediment, culture												Yes		Yes
Echocardiography	Yes						Yes	Yes		Yes	Yes			Yes
Spirometry	Yes						Yes	Yes	Yes					
ECG	Yes						Yes	Yes		Yes	Yes			
Chest x-ray	Yes						Yes	Yes	Yes					Yes
Lung ultrasound							Yes	Yes	Yes					
Joint ultrasound					Yes									
Fundoscopy			Yes											
Tuberculin test									Yes					Yes
BP, HR	Yes		Yes				Yes	Yes		Yes	Yes			
O2 saturation	Yes						Yes	Yes						

5. Treatment

Healthcare professionals must understand that this new situation can radically change the lives of patients and families and that at present there is no curative treatment or a clear prognosis.

Therefore, it is essential to give validity to what patients explain, empathize with uncertainty and offer all available tools to try to recover the previous state of health.

Since the cause of post-COVID-19 condition has not yet been established, treatment will be based on symptoms.

Pharmacological and non-pharmacological measures will be taken, addressing both physical and emotional health.

The recommendations given to patients should be aimed at understanding the situation (explaining that the recovery process can be long and improvements can be slow with relapses), minimizing possible triggers (stress, lack of rest or hours of sleep, physical or mental activity greater than tolerated) and continue physical or cognitive activity progressively adapting to the current situation.

The patient will be offered tools for the control, management, self-knowledge and monitoring of their symptoms (see Annex 14, 15, 16).

- Symptom diary (look for triggers) and sleep pattern log
- Fatigue control advice
- Sleep recommendations
- Physical and respiratory exercise
- Cognitive exercise
- Dietary recommendations
- Smell training (if anosmia)

The main objective is to recover as soon as possible the school activity that I the patient had before with the least school absence.

6. Referral criteria

It is essential a global vision and accompaniment of the patient from primary care.

Referral to the emergency department

The presence of warning signs requiring urgent attention should be assessed:

- Suspected sepsis, Kawasaki disease or PIMS-TS
- Headache with abnormal neurological exam and/or signs of endocranial hypertension
- Focal neurologic signs
- Worsening of respiratory distress with O2 saturation< 92%
- Suspected rhabdomyolysis
- Fever and joint swelling
- Oral intolerance
- Dehydration
- Acute abdomen
- Heart failure, paroxysmal supraventricular tachycardia
- Kidney or liver failure
- Severe anaemia (Hb<7 g/dl)
- Anaphylaxis
- Suicide attempt

Referral to specialists or post-COVID-19 condition units

If necessary, the patient will be referred to specialists or post-COVID-19 condition units according to the possibilities of the territory and the referral centre.

The referral will be considered if the patient presents with post-COVID-19 condition symptoms after 8 **weeks** (individualize depending on the case) of the onset of symptoms, after having made an initial evaluation with first line investigations, recommendations and symptoms diary in the previous weeks.

Rehabilitation

- Moderate or severe fatigue according to FACIT-F scale
- Exercise intolerance
- Moderate or severe dyspnoea on the mMRC scale (≥2)

Child and Youth Mental Health Service (CYMHS)

- Depression
- Anxiety

- Self-harm
- Eating disorder
- Conversive disorder
- Insomnia refractory to sleep hygiene measures

School Psychopedagogical Guidance Team

- Alteration of concentration
- Low academic performance compared to previous state
- Low tolerance to mental exertion

It is necessary to inform the teacher of the student (model of letter in Annex 18) about the situation in which the child or adolescent is at that moment, so that the appropriate evaluations can be carried out by the Psychopedagogical Guidance Team/school, as well as the pedagogical adaptations and appropriate interventions depending on the degree of cognitive impairment and the clinical course (recommendations Annex 19).

Pulmonology/Allergy

- Dyspnoea of any intensity
- Persistent cough after first line investigations
- Abnormal chest X-ray
- If spirometry is needed and it is not possible to perform it in primary care
- Spirometry alteration
- After an episode of anaphylaxis (allergy)

Gastroenterology

- Abdominal pain 2-3 episodes/month and moderate-severe intensity that do not resolve with analgesia
- Suspected inflammatory bowel disease
- Dysphagia

Cardiology

- ECG alterations
- Chest pain with exercise
- Palpitations, pre-syncope or syncope

Neurology

- Headache 2-3 episodes/month and moderate-severe intensity with no response to analgesia
- Persistent acute vertigo (>1 week), suspected central vertigo (progressive onset, horizontal or vertical nystagmus, neurological symptoms), migraine, or epilepsy
- Paraesthesia with muscle weakness and/or sphincter involvement

Infectious diseases

- Axillary Tª ≥37.5ºC for more than 4 weeks without having found aetiology after first line tests

Rheumatology

- Muscle or joint pain with functional disability or daily need for analgesia after first line tests
- Joint swelling or suspicion of arthritis and/or elevation of acute phase reactants or analytical alterations that suggest an autoimmune disease (ANA>1/160, RF positive, cytopenia, ASLO positive, elevation of CK)
- Suspicion of an autoinflammatory disease

Dermatology

- Urticaria > 6 weeks
- Alopecia areata

ORL

- Anosmia that does not improve after 3 months of smell training
- Persistent acute vertigo (>1 week), suspected peripheral vertigo (rapid onset, horizontal nystagmus, inhibited with gaze fixation, positive Romberg) with hearing loss, vestibular neuronitis, infantile benign and positional paroxysmal vertigo, cholesteatoma
- Tinnitus constantly present, unilateral or asymmetric, with hearing loss or vertigo
- Dysphonia and dysphagia

7. Follow-up

Follow-up visits can be alternated virtually or by telephone with face-to-face visits at 1, 2, 3 months of infection and then every 3 months (more frequent depending on the clinical course).

It is recommended to follow up the patient until after 6 months without symptoms.

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Annex 1. Pain assessment scales

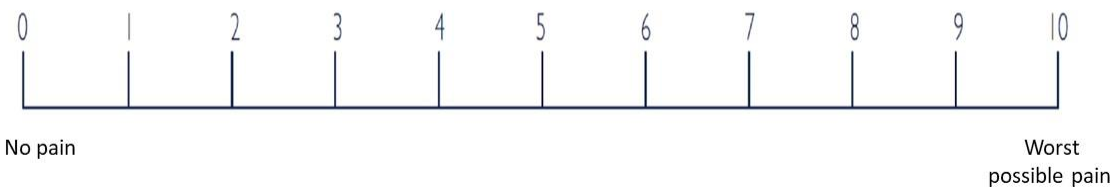
In the following scales the pain will be evaluated as follows: mild 1-3 points, moderate 4-7 points, severe 8-10 points.

FLACC scale (children from 1 month to 3 years old and non-collaborating children)

Behaviour	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jow
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams, sobs, frequent complaints
Consolability	Content, relaxed	Reassured by touching, hugging or being talked to, distractible	Difficult to console or comfort

Wong Baker scale (3-7 years)

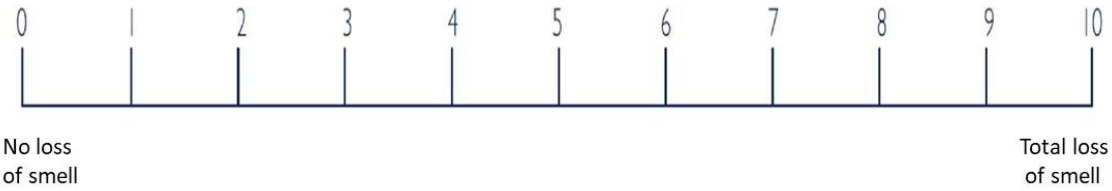
Numerical rating scale (≥ 8 years)



Annex 2. Anosmia assessment scale (numerical)

It will be evaluated as follows: mild 1-3 points, moderate 4-7 points,

serious 8-10 points.



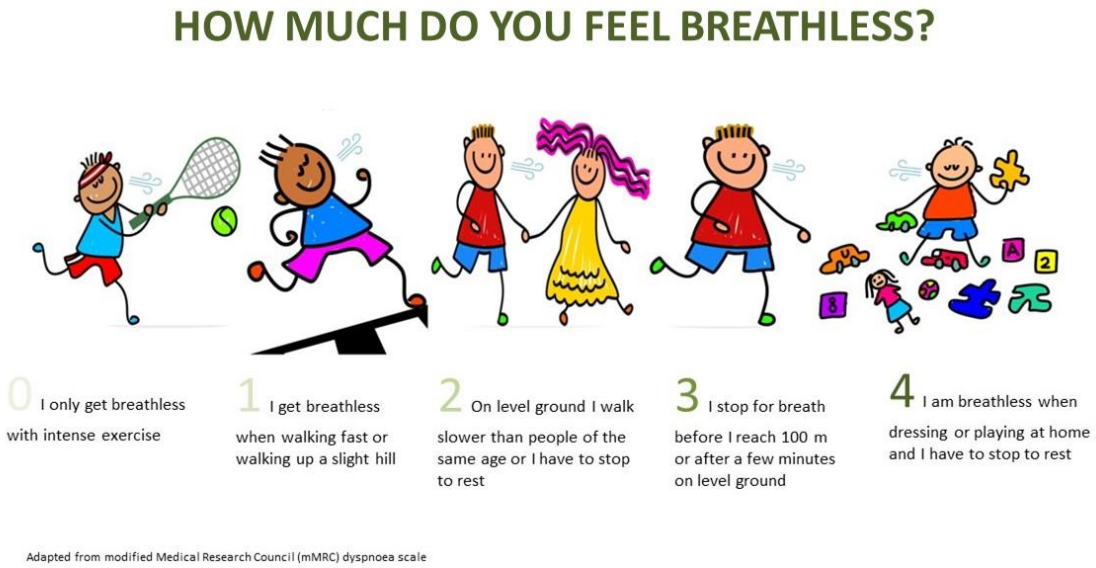
Annex 3. Fatigue Assessment Scale (FACIT-F)

It will be evaluated with the FACIT fatigue scale (version 4) as follows: absent fatigue 45-52 points, mild 31-44 points, moderate 21-30 points, severe 0-20 points.

The scale can be found at: https://www.facit.org/measures/peds-FACIT-F

Annex 4. Medical Research Council (mMRC) modified dyspnoea scale

It is classified from 0 to 4: 0 = absent dyspnoea, 1 = mild, 2 = moderate, 3 = severe, 4 = very severe.



Adapted from modified Medical Research Council (mMRC) dyspnoea scale

Annex 5. Quality of Life Questionnaire (PedsQL): score

It measures the quality of life in the last 4 weeks. It can be completed by both parents and children and adolescents. There is a questionnaire for children from 2 to 7 years old and another from the age of 8. Duration: less than 4 minutes.

Global Health = Total Health

It is evaluated by the following scales:

- Physical health
- Psychosocial functioning: emotional state, social activities and school activities

The answers score from 0 to 4, 0 = never, 1 = almost never, 2 = sometimes, 3 = often, 4 = almost always. They are transformed on a scale from 0 to 100: 0 = 100; 1 = 75; 2 = 50; 3 = 25 and 4 = 0. If they do not answer more than 50% the scores of that scale are not counted.
The points of the scale 0-100 are added and divided by the number of items answered.

Global health = Physical health + Psychosocial functioning and it is divided by all the items answered. For example: if you have answered the 23 items: Physical health maximum score 800 + Psychosocial functioning maximum score 1500: total 2300 divided by 23= Global health 100

http://pedsql.org/index.html

Welfare

The questionnaire ends with a few questions about well-being and health in general. The Welfare score has no correction, the maximum would be 24. Finally, the "Overall" indicator also scores normal from 0 (Poor health) to 4 (Excellent health).

Annex 6. Quality of life questionnaire (PedsQL) in children from 2 to 7 years old

Questionnaires can be obtained at: http://pedsql.org/index.html

Annex 7. Quality of life questionnaire (PedsQL) from the age of 8 years old

Questionnaires can be obtained at: http://pedsql.org/index.html

Annex 8. Psychopathology screening questionnaire (SDQ): score

The Strengths and Difficulties questionnaire is a questionnaire of 25 items that comprise 5 scales of analysis: emotional symptoms, conduct problems, hyperactivity or inattention, peer relationships problem and prosocial behaviour.

https://www.sdqinfo.org/a0.html

Each item scores according to three categories of answers: 0= not true, 1 = somewhat true, 2= certainly true. Each scale score between 0 and 10. The higher the score of the scale, the more likely is to suffer from a mental health problem, except for the prosocial scale. The sum of the first four scales (except for the prosocial scale) generates the *total difficulties score* (TDS), which value is between 0 and 40 points, from having no problems to the maximum of problems possible.

Annex 9. Psychopathology screening questionnaire (SDQ) in children from 4 to 17 years old

Questionnaire can be obtained at: https://www.sdqinfo.org/a0.html

Annex 10. Assessment of functional or exercise capacity: 1 minute sit-to-stand test

It consists of sitting and getting up from the chair without putting the hands (asking the patient to cross the hands on the chest), as many times as possible for 1 minute with the patient connected to the saturator.

Before performing the test, the patient will be informed of what it consists of and will be told that he/she can stop at the time he deems necessary (he/she must indicate the reason).

It should not be done in a place not supervised by health personnel if the baseline saturation is less than 96%.

1. The minute is timed
2. The number of repetitions performed is counted
3. O2 saturation is observed for 1 minute after exercise and heart rate, wait to observe recovery from baseline parameters

If O2 saturation decreases >4% of the basal value consider it as a desaturation with exertion.

Annex 11. Medical Research Council (MRC) manual muscle testing

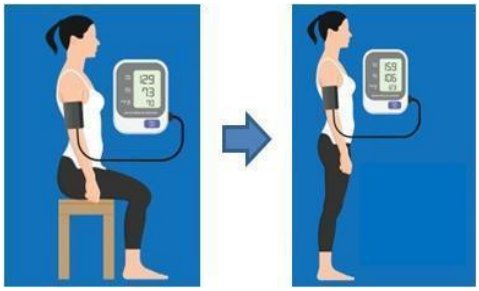
It evaluates the strength of the upper and lower extremities; the normal value would be a 5.

0	**Absence of contraction**
1	**Contraction without movement**
2	**Active movement but not against gravity**
3	**Active movement against gravity**
4	**Active movement against gravity and partial resistance**
5	**Active movement against full resistance**

Annex 12. Active Stand Test

To assess whether there is autonomic nervous system dysfunction with orthostatic hypotension or orthostatic postural tachycardia (POTS).

1. The patient is placed lying in supine position or sitting for at least 5 minutes
2. Blood pressure and heart rate are measured
3. The patient is then placed in standing position
4. After 1 minute and 3 minutes of standing, blood pressure and heart rate are measured



The diagnosis of **orthostatic hypotension** is considered when there is a symptomatic or asymptomatic drop in systolic blood pressure ≥ 20 mmHg.

The diagnosis of **orthostatic postural tachycardia (POTS)** is considered when there is a sustained increase in heart rate of more than 40 beats per minute (usually in these cases there is no decrease in blood pressure).

Annex 13. Differential diagnosis of specific symptoms

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Fatigue - Physical and/or mental fatigue with moderate or small efforts (e.g., showering), the patient stops because "the body does not respond" - It takes a long time to recover (> 24 hours) and non-restful sleep - Substantial decrease in school, social and personal activities - Gets worse after physical or mental overwork	O2sat, HR, BP Start/end date Frequency Duration Intensity -FACIT-F -1 min STST Aggravating factors QL impact	Anaemia Coeliac disease Hypothyroidism Adrenal insufficiency Renal failure Liver failure Heart failure Respiratory failure Other infections: EBV, CMV, HHV6, HIV, Parvovirus B19, *Borrelia* Myopathies	FBC, ESR, CRP Ferritin, Vit B12, folic acid IgA anti-TG Immunoglobulins Vit D25OH, TSH Cortisol 8h Proteins, albumin Glucose Liver profile Renal profile Serology EBV, CMV CK ECG Chest X-ray	**Emergency** -respiratory, cardiac, renal or liver failure -Severe anaemia (Hb<7 g/dl) **Cardiology** -Abnormal cardiac physical exam -It associates tachycardia, palpitations, syncope, chest pain with exercise -Abnormal ECG -Known heart disease **Pulmonology/Allergy** -It associates dyspnoea -Abnormal chest x-ray -Known lung disease **Rehabilitation** -Moderate or severe fatigue according to FACIT-F -If exercise intolerance	Troponin T, NT-proBNP Echocardiography Spirometry Skin prick test, total and specific IgE, allergen provocation test Other serologies: HHV6, HIV, Parvovirus B19, *Borrelia*	Physical and mental activity - Know the limits of physical and mental activity to avoid worsening - Learn to balance rest and activity - Set a goal for the patient (go to school every day) and increase the number and intensity of activities gradually until reaching the goal set Sleep hygiene
Cognitive dysfunction and emotional involvement -Difficulty in concentration, attention, short-term memory -Clear decrease in academic performance -Changes in mood, depression, anxiety, sleep disorders	Start/end date Frequency Duration Aggravating factors PedsQL SDQ	Brain tumour or abscess Tuberculous meningitis Epilepsy Autoimmune encephalitis Hypo/Hyperthyroidism Anaemia Kidney, liver or adrenal failure Wilson's disease Adjustment disorder	FBC, ESR, CRP Ferritin Vit B12, folic acid TSH Glucose Renal profile Liver profile Cortisol 8h	**Emergency** -Signs of endocranial hypertension -Suicide attempt **Neurology** -Abnormal neurological physical exam -Suspected epilepsy **Rehabilitation** -School Psychopedagogical Guidance Team **CYMHS** -Depression, anxiety, self-harm, eating disorder, conversive disorder, insomnia refractory to sleep hygiene	Brain MRI/CT/PET EEG Lumbar puncture Copper, ceruloplasmin Polysomnography	Avoid multitasking (e.g., studying and listening to music), focus on a single task Sleep hygiene, melatonin Relaxation techniques

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Headache	BP Start/end date Frequency Duration Intensity -NRS Aggravating factors QL impact	Tension headache Migraine Sinusitis High blood pressure Endocranial hypertension	Fundoscopy	**Emergency** -Abnormal neurological physical exam -Signs of endocranial hypertension **Neurology** -2-3 episodes/month moderate-severe intensity -Does not resolve with analgesia -Severe episodes with intense vomiting	Brain MRI/CT	Analgesia as soon as the pain appears Sleep hygiene Relaxation techniques
Anosmia/ageusia	Start/end date Duration Intensity -NRS QL impact	Rhinosinusitis Nasal polyps Brain tumours		**ORL** -It does not improve after 3 months of smell training **Neurology** -If accompanied by neurological clinic	Nasal endoscopy Olfactometry/taste test Brain MRI	Smell training -Smell different scents like lemon, rose, cloves, eucalyptus, remembering how they smelled -Do it for 15 seconds each, 2 times a day for at least 3 months
Joint pain	Start/end date Frequency Duration Intensity -NRS Aggravating factors QL impact	JIA SLE Rheumatic fever Leukaemia Viral or bacterial infection	ANA, RF, HLAB27 ASLO, LDH FBC, ESR, CRP Serology Parvovirus B19, EBV, CMV, *M. pneumoniae*	**Emergency** -Fever and joint swelling **Rheumatology** -Pain with functional disability or daily need for analgesia -Suspicion of autoimmune arthritis (ANA>1/160, RF or ASLO positive)	Joint ultrasound	Analgesia (ibuprofen)

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Muscle pain	Start/end date Frequency Duration Intensity -NRS Aggravating factors QL impact	Viral myositis Dermatomyositis Hypothyroidism Adrenal insufficiency	Respiratory viruses Ag test CK, ANA TSH Cortisol 8h	**Emergency** -Suspected rhabdomyolysis **Rheumatology** -Pain with functional disability or daily need for analgesia	EMG	Analgesia
Chest pain -Nonspecific, poorly located, not related to exercise	O2 sat, HR, BP Start/end date Frequency Duration Intensity -NRS Aggravating factors QL impact	Musculoskeletal Respiratory -Asthma -Pneumonia, pleural effusion -Pneumothorax -Pulmonary thromboembolism Gastrointestinal -Gastroesophageal reflux Cardiovascular -Myocarditis -Pericarditis Psychogenic	Chest X-ray Lung ultrasound ECG D-dimer	**Emergency** -Signs of heart or respiratory failure **Cardiology** -Abnormal cardiac physical exam -It associates tachycardia, palpitations, syncope, pain with exercise -Abnormal ECG -Known heart disease **Pulmonology/Allergy** -It associates dyspnoea -Abnormal chest x-ray -Known lung disease	Troponin T, NT-proBNP Echocardiography, cardiac MRI Cardiac stress test Spirometry Chest CT Skin prick test, total and specific IgE, allergen provocation test	Analgesia
Dyspnoea -Feeling of not being able to breathe well enough -It usually appears during an aerobic exertion with an increase in respiratory rate	O2 sat, HR, BP Start/end date Frequency Duration Intensity -mMRC -1 min STST Aggravating factors QL impact	Respiratory failure -Asthma -Pneumonia, pleural effusion -Pneumothorax -Pulmonary thromboembolism -Heart failure -Myocarditis -Pericarditis Anaemia Dyspnoea with exercise -Exercise-induced asthma -Inducible laryngeal obstruction	Chest X-ray Lung ultrasound ECG D-dimer FBC, ferritin	**Emergency** -Signs of heart or respiratory failure **Pulmonology/Allergy** -Persistent dyspnoea of any severity **Rehabilitation** -Moderate or severe dyspnoea (mMRC≥2)	6 MWT Spirometry Chest CT CT pulmonary angiography, SPECT lung scintigraphy V/Q lung scintigraphy Flexible bronchoscopy Blood gas analysis Skin prick test, total and specific IgE, allergen provocation test Troponin T, NT-proBNP Echocardiography, cardiac MRI Cardiac stress test	Inhaled corticosteroids +- LABA Breathing exercises

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Cough	Start/end date Frequency Duration Aggravating factors QL impact	Sinusitis Asthma Foreign body aspiration *B. pertussis, M. pneumoniae* infection Tuberculosis Gastroesophageal reflux Heart failure Psychogenic cough	Chest X-ray Lung ultrasound Tuberculin test PCR *B. pertussis* Serology *M. pneumoniae* FBC, ESR, CRP Immunoglobulins	**Emergency** -Signs of heart or respiratory failure **Pulmonology/Allergy** -Persistent cough after doing first line testing -Known pneumopathy	Spirometry Chest CT Flexible bronchoscopy Sputum culture Skin prick test, total and specific IgE, allergen provocation test	Inhaled corticosteroids +- LABA
Palpitations	Active stand test -BP and HR supine and standing Start/end date Frequency Duration Aggravating factors QL impact	Extrasystoles Tachycardia -PSVT -POTS -Hyperthyroidism -Anaemia -Fever, drugs, exercise, stress	ECG TSH FBC, ferritin	**Emergency** -Signs of heart failure, PSVT **Cardiology** -Abnormal cardiac physical exam -It associates chest pain, syncope -ECG anormal, POTS -Known heart disease	Holter 24h Echocardiography	
Dizziness -Autonomic nervous system dysfunction with orthostatic hypotension, vasovagal syncope and orthostatic postural tachycardia syndrome (POTS)	Active stand test - BP and HR supine and standing Start/end date Frequency Duration Aggravating factors QL impact	Vertigo Anaemia Hyperthyroidism	ECG FBC, ferritin Renal profile Vit D25OH, TSH	**Emergency** -Signs of heart failure -Severe anaemia (Hb<7 g/dl) **Cardiology** -Abnormal cardiac physical exam -It associates chest pain, syncope -ECG anormal, POTS -Known heart disease **Neurology** -Persistent central or acute vertigo>1 week **ORL** -Persistent acute vertigo>1 week, hearing loss	Echocardiography Tilt test	Adequate water and salt intake Gradual daily physical exercise (setting goals, e.g., going back to school) Sleep hygiene

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Gastrointestinal -Anorexia -Nausea/vomiting -Diarrhoea -Abdominal pain/bloating	Weight, BMI Start/end date Frequency Duration Intensity - number vomiting or diarrhoea/day -mucus/blood in faeces -NRS for pain Aggravating factors QL impact	Gastroenteritis Intestinal parasites Inflammatory bowel disease Coeliac disease Pancreatitis Appendicitis Mesenteric adenitis Urinary tract infection *H. pylori* infection Lactose/fructose intolerance Irritable bowel syndrome Hypercalciuria PIMS-TS	FBC, ESR, CRP Ferritin, Vit B12, folic acid IgA anti-TG Immunoglobulins Vit D25OH, TSH Proteins, albumin Glucose Liver profile, lipase Renal profile Urine sediment and culture Abdominal ultrasound Stool culture Stool parasites test Stool *H. pylori* Ag test	**Emergency** -Oral intolerance -Signs of dehydration -Acute abdomen -Suspicion of PIMS-TS **Gastroenterology** -Suspicion of inflammatory bowel disease -2-3 episodes/month of moderate-severe abdominal pain that does not resolve with analgesia	Calprotectin Urine Ca/creatinine index Digestive endoscopy MR enterography, abdominal CT	Analgesia Probiotics PPI Lactose-free diet Dietary recommendations
Mucocutaneous manifestations -Rashes -Dermographism -Pernio-like -Oral sores, glossodynia -Trichodynia, telogen effluvium, alopecia	Start/end date Frequency Duration Aggravating factors QL impact	Exanthems -Other viruses: EBV, Parvovirus B19, HIV; *M. pneumoniae* -Drugs -Food -Kawasaki disease, PIMS-TS -Dermatitis artefacta -Systemic JIA, SLE Perniosis Recurrent oral ulcers -Minor idiopathic recurrent aphthous stomatitis -Anaemia -Neutropenia -PFAPA -Coeliac disease -Herpetic stomatitis -Behçet's disease Alopecia -Tinea capitis -Alopecia areata - -Traumatic alopecia -Iron deficiency anaemia	FBC, ESR, CRP ferritin Vit B12, folic acid IgA anti-TG Immunoglobulins TSH, ANA, RF Serologies: EBV, *M. pneumoniae,* Parvovirus B19, HIV Fungal culture	**Emergency** -Anaphylaxis, suspected sepsis, Kawasaki or PIMS-TS **Allergy** -Food allergy -After an episode of anaphylaxis **Dermatology** -Urticaria>6 weeks -Alopecia areata	PCR herpes simplex virus Skin prick test, total and specific IgE, allergen provocation test Zinc	Antihistamine Topical corticosteroid Analgesia

Manifestations	Assessment	Differential diagnosis	PC investigations	Referral criteria	HC investigations	Treatment
Fever	Start/end date Frequency Duration Maximum temp Aggravating factors QL impact	<u>Prolonged fever</u> Adenovirus infection Infectious mononucleosis Urinary tract infection Tuberculosis Pelvic discitis/osteomyelitis Endocarditis Sinusitis Mastoiditis Abdominal abscess *Salmonella* infection Malaria Visceral leishmaniasis Other infections: *B. henselae, M. pneumoniae*, Parvovirus B19, HIV, Toxoplasma, *Brucella, Borrelia,* Rickettsia Malignancy -Leukaemia, lymphoma -Neuroblastoma Autoimmune diseases -JIA -SLE Hyperthyroidism Inflammatory bowel disease Kawasaki disease, PIMS-TS <u>Recurrent fever</u> -Self-limiting sequential infections -PFAPA -Cyclic neutropenia -Autoinflammatory diseases	Respiratory viruses Ag test EBV, CMV serology Urine sediment and culture Tuberculin test Chest X-ray FBC, ESR, CRP Liver and renal profile Ferritin LDH, ANA, RF, TSH Vitamin D25OH Immunoglobulins Stool culture Abdominal ultrasound	**Emergency** -Suspicion of sepsis, Kawasaki, PIMS-TS **Infectious diseases** -Ax temp ≥37.5ºC for more than 4 weeks without having found aetiology after first line tests **Rheumatology** -Suspicion of autoinflammatory disease	Other serologies: *B. henselae, M. pneumoniae*, Parvovirus B19, HIV, Toxoplasma, *Brucella, Borrelia*, *Rickettsia* Blood cultures Peripheral blood smear Calprotectin Echocardiography Bone MRI or bone scintigraphy Mastoid/sinuses CT Chest/abdomen CT Brain MRI/CT Digestive endoscopy Lymph node biopsy Bone marrow aspirate PET/CT	Antipyretic drugs

Annex 14. Symptom diary

First and last name: **Date:**

	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su
Have I had fever? [1]																												
Have I had cough? (yes/no)																												
Have I felt fatigued/exhausted? [2]																												
Have I felt that I cannot get enough air in, my chest feels tight? [3]																												
Have I had headache? [4]																												
Have I had chest pain? [4]																												
Have I noticed palpitations/that the heart is going faster? (yes/no)																												
Have I felt dizzy? (yes/no)																												
Have I had muscle pain? [4]																												
Have I had vomiting? (number)																												
Have I had diarrhoea? (number)																												
Have I had tummy pain? [4]																												
Have I been able to go to school/institute? [5]																												
Have I been able to do sports/leisure activities? (yes/no)																												
Have I slept/rested well? (yes/no)																												
Have I felt sad/discouraged? (yes/no)																												
Have I had a hard time concentrating (reading a book, following a movie)? (yes/no)																												
Have I forgotten what I was going to do, basic things of the day? (yes/no)																												

1. If fever, indicate in the box maximum temperature of the day
2. Mark fatigue according to intensity (1 = none, 2 = a little, 3 = some, 4 = a lot, 5 = extreme)
3. Mark breathlessness according to intensity (0 = none, 1 = out of air when climbing stairs or walking fast, 2 = out of air when walking on plain, 3 = out of air when walking <100m and I have to stop, 4 = out of air when doing activities of the day like dressing or showering)
4. Mark pain according to intensity (on a scale from 0 to 10, 0 = none, 10 = unbearable)
5. Mark school attendance based on time I've gone (0 = haven't gone all day, 1 = I've been half a day or less, 2 = I've gone all day)

Other symptoms can be added in the blank left boxes.

Annex 15. Sleep pattern record **First and last name:** **Date:**

Fill it in each morning when you get up and do it for at least 14 days in a row (includes weekend)

	Mo	Tu	W	Th	Fr	Sa	Su	Mo	Tu	W	Th	Fr	Sa	Su
Went to bed at (hour)														
Fell asleep at (hour)														
Woke up at (hour)														
Slept in total (number of hours)														
I woke up during the night (number of times)														
Reason to wake up during the sleep (noise, heat...)														
Have you taken a nap? (yes/no)														
Nap duration (minutes)														

Annex 16. Recommendations for patients with post-COVID-19 condition

Fatigue control

Maybe there are days when you notice fatigue that doesn't allow you to get out of bed, your muscles feel heavy and you can't move. You may notice that after walking a little bit you have to stop or that anything that was simple now you can't do it, you have to leave it halfway.

Sometimes these activities are physical (walking, doing housework, talking...) and sometimes mental (reading a book, concentrating on a lesson, watching a series or listening to music...)

There are other moments that you find yourself better, you encourage yourself to do things and then or the next day you get worse again and so cyclically.

THE 5 KEYS	**Plan** **Prioritize** **Rest** **Listen to yourself** **Exercise**

PLAN AND PRIORITIZE What should you do today? What is a priority of all this? Are there things you can do another day? Organize your physical activity (walking, tidying up the room, exercising...), mental activity (reading, being on your computer, listening to music...) and above all think about when you will rest.

Morning	
Afternoon	
Evening	

REST Surely there will be times of the day when you will have to rest. It is best to get to rest when you still have a little energy and that's why it's important to plan and listen to yourself.

Anticipate that state of maximum fatigue to charge the batteries more easily.

LISTEN When you are doing any activity you should try not to do the maximum effort that then leaves you unable to do anything else. That's why this scale is useful:

BORG SCALE rate of perceived exertion	
1	**Nothing**
2	**Very Easy**
3	**Easy**
4	**Comfortable**
5	**Somewhat Difficult**
6	**Difficult**
7	**Hard**
8	**Very Hard**
9	**Extremely Hard**
10	**Maximal/Exhaustion**

Put it in a visible place and it will help to regulate yourself. The ideal is to be between 3-4 and when the activity starts to be heavy (because you get breathless, your head hurts, your legs get tired, it gets difficult to pay attention ...) you should stop.

Gradual physical **EXERCISE** adapted to you is essential for recovery. Surely you will not be able to do what you did, but activating yourself, stopping being at rest all day, will gradually allow you to endure more and more.

Sleep recommendations

Place:

- The bed should be a place used only for sleeping
- Suitable environment: ventilated, silent, with low light and pleasant temperature

Schedule and time:

- Get up and go to sleep every day, at the same time, maintaining a fixed and regular sleep schedule, adapted to the age and needs of each person
- Avoid more than an hour of variation between school days and holidays

Previous activities:

- Limit the use of television, computer and mobile phone in the room at night
- Avoid paying attention to worries, watching action or scary movies or argue
- Avoid significant physical exertion before going to sleep
- Dine at least an hour before bedtime, avoiding excess fluids, try not to go to sleep on an empty or too full stomach
- Avoid the consumption of stimulants and other substances that affect sleep: chocolate, sugar, cola, tobacco, alcohol or caffeine

Daytime habits:

- Promote exercise practice on a regular basis
- Spend some time outdoors every day
- Limit sleep during the day outside of recommended hours
- Establish regular naps during the day and appropriate in duration and schedule, according to individual needs and age. Avoid long naps, especially near bedtime

Psychological state:

- Building self-confidence to face daily challenges increases the ability to fall asleep autonomously
- Promote a calm and communicative family environment
- Establish positive associations with sleep so that the child sleeps autonomously and without the help of the parents
- Talk during the day about possible concerns around sleep, agreeing on small aids that can facilitate to sleep autonomously (dim light, reassuring thoughts, guided sleep with a "mindfulness" approach, breathing techniques and imagination)
- Trying hard to get to sleep and looking frequently what time it is can sometimes make things worse. It is preferable to focus on body rest as a goal and occupy the mind with calm thoughts

Physical and respiratory exercise

Walk every day, in contact with nature including any green space (parks, gardens, mountain).

PROPOSAL OF EXERCISES AND GENERAL RECOMMENDATIONS FOR CHILDREN AND ADOLESCENTS WITH SYMPTOMS OF MILD FUNCTIONAL INVOLVEMENT SECONDARY TO POST-COVID-19 CONDITION

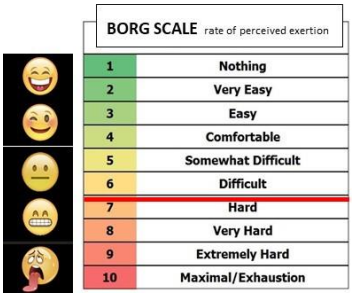
SPORTS ACTIVITIES

It is recommended to return to the usual sports activity progressively, initially 1 day a week of training and when it is tolerated to move to perform 2 days a week. Subsequently restart competitions/matches.

AEROBIC TRAINING

Perform global aerobic exercises. 3-5 times a week starting with 15 minutes and gradually increasing until 45 effective minutes. Examples: walking or cycling.

Start with a Borg scale of 3, until you reach a maximum of 5-6.



BREATHING EXERCISES

Abdominal-diaphragmatic breathing

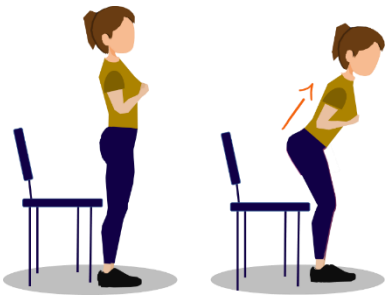
In a sitting position, with your knees bent, place both hands on your abdomen. Catch air deep through the nose with your mouth closed (when breathing, the abdomen will relax causing your hands to rise). Place the lips as if whistling and take out the air passively, slowly and gently (when expelling the air, the abdominal musculature will become depressed and return to the initial position).

Repeat the exercise 5 times, with a frequency of 2 times a day. Progress to 10-15 repetitions.

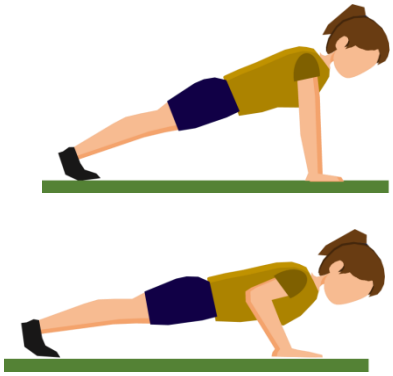
MUSCLE STRENGTH EXERCISES

Exercises that follow functional movements are recommended; training of large muscle groups will be performed with exercises coordinated with breathing. Free weights, elastic bands, or the body weight itself may be used.

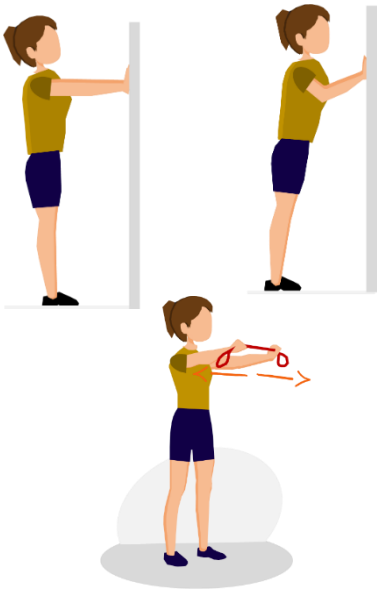
Strength exercises are recommended 2-3 days a week. 2-3 sets can be performed according to tolerance of 8-10 repetitions. With minimum rest of 1 minute between sets. The use of free weights is recommended from 14 years old.



Example for lower extremities: squat or sit and get up from a chair, march with obstacles, go up and down stairs.



Legs extended and feet resting on the ground. Place the hands shoulder width apart on the ground, with the elbows in extension. Bring your chest close to the floor by flexing your elbows and return to the starting position.



Place hands shoulder width apart leaning on the wall. Carry the weight of the body towards the hands without moving the feet off the ground. Hold for 3 seconds and return to the starting position.

Stretching

At the end of the exercise schedule, it is recommended to perform global stretches.

Hamstring and triceps surae muscles stretch. With the back straight, one leg flexed and the other extended try to bend the hip towards the leg extended. Hold 10-30 seconds. Do 3 to 5 repetitions. After that return to the initial position and switch sides.

Pectoral muscle stretching. Standing in the corner of a wall, put your arm with a flexion around 90º, twist gently the trunk away from the arm until you feel the stretch of the pectoral muscle without pain. Hold 10-30 seconds. Do 3 to 5 repetitions. After that return to the initial position and switch sides.

Authors: Text: Dr. Roser Coll Fernández and Dr. Ariadna Riera Castelló
Drawings: Dr. Carlos López Castillo

Cognitive exercise

Follow the instructions recommended by the educational psychologist or teachers to promote recovery.

Dietary recommendations

Healthy/balanced diet and adequate fluid intake.

Avoid excessive intake of dairy products, starches, carbonated beverages, industrial pastries and sorbitol, especially if abdominal pain or diarrhoea.

Smell training (if anosmia)

Smell 4 scents every day 2 times a day for 3 months: rose, eucalyptus, lemon, cloves

- Choose a smell, smell it for 15 seconds, trying to remember how it smelled before
- Rest for 10 seconds
- Smell the next one for 15 seconds
- Rest for 10 seconds
- Repeat until you complete the 4 scents

Annex 17. Patient/family infographic

How is it possible that you have not recovered to normal health after weeks of SARS-CoV-2 virus infection?
You could meet the diagnostic criteria for Long COVID

Common symptoms

Physical and mental fatigue
Shortness of breath
Headache
Chest pain
Palpitations
Joint or muscle pain
Abdominal pain, vomiting, diarrhoea
Loss of smell and taste
Rashes

Sometimes they are intermittent

Get daily physical and mental activity without overdoing it and rest when necessary

Ensure a good night rest

Eat a balanced diet
and have an adequate water intake

As it is not yet known why this occurs, we do not have a specific treatment

Your primary care paediatrician will make you an assessment, offer you support and follow-up

Annex 18. Post-COVID-19 condition patient medical report for the school

Date:

To the attention of the teaching staff of the educational centre,

The student ..... has symptoms consistent with "pediatric post-COVID-19 condition." This means that after being evaluated in the paediatric consultation, in accordance with *the Recommendations for the clinical management of children and adolescents with post-COVID-19 condition* of the Catalan Society of Paediatrics, we consider that SARS-CoV-2 virus infection has caused symptoms beyond 12 weeks.

This entity can cause a variability of symptoms such as fatigue, breathlessness, headache, low tolerance to physical and mental effort, decreased academic performance (concentration...) among others. It is not possible to determine what the total recovery time will be. The follow-up is being carried out in accordance with the aforementioned document. The main objective is that the student recovers as soon as possible the school activity that he had before with the least school absence.

For this reason, it is requested that the appropriate evaluations be carried out by the school (Psychopedagogical Guidance Team) and the corresponding professionals in order to carry out the most appropriate adaptations and psychopedagogical interventions in this case.

We are at your disposal for any information you need.

Best wishes

Dr.

Annex 19. Recommendations to improve school learning

Children and adolescents with post-COVID-19 condition may have concentration problems (sustained attention) that impact their verbal memory and working memory capacity (ability to maintain information while doing complex tasks), reduced processing speed, and executive difficulties. They may also have anxiety or mood disorders.

All these symptoms have a great impact on their school learning and it is necessary to adapt the school rhythm to the neuropsychological deficits presented by the child or adolescent.

Below are some recommendations to assess, however you must follow the instructions of the psychopedagogue or specific teachers according to the degree of cognitive involvement and the progression of each case.

Recommendations to improve school learning

- Give the time necessary to finish the tasks
- Avoid adding pressure in reference to time or demand
- Make frequent breaks
- Manage time through flexible and realistic schedules
- Ensure that previously learned information can be remembered before submitting a new one
- Use external aids to enhance learning (notes, drawings, lists, recordings)
- Simplify information
- Provide written instructions
- Avoid performing activities simultaneously
- Choose the least complex version of an activity
- Reduce the volume of homework

Recommendations during exams

- Give extra time during exams
- Allow books to be used during exams
- Avoid long exams, fragment activities into shorter tasks
- Consider the option of performing some exams orally

Annex 20. Checklist for consultation

CHECK LIST

Anamnesis

- ☐ Ask about the symptoms of the acute phase of infection
- ☐ Ask about current symptoms (use the list in the introduction as a guide; assess duration, frequency, triggers or aggravating factors, numerical rating scale for pain, FACIT-F for fatigue, mMRC for dyspnoea)
- ☐ Ask about daily life, pass quality of life assessment questionnaire (PedsQL), consider if specific psychopathology screening (SDQ) is needed
- ☐ Ask about family, personal and past medical history

Physical examination

- ☐ Perform complete physical examination, measure vital signs, weight and height
- ☐ Evaluate functional or exercise capacity depending on the symptoms (1 min STST)
- ☐ Evaluate muscle strength depending on the symptoms (MRC scale)
- ☐ Evaluate orthostatic hypotension or orthostatic postural tachycardia depending on the symptoms (active stand test)

Investigations

- ☐ Review the differential diagnosis of the specific symptom
- ☐ Request additional tests according to clinical suspicion

Treatment

- ☐ Assess whether treatment is needed

Referral criteria

- ☐ Check if the patient meets specialized care referral criteria

Follow up

- ☐ Give symptom diary and sleep pattern log
- ☐ Give recommendations to the patient
- ☐ Give the next follow-up appointment

In case of doubts and/or suggestions about this guideline you can contact:

covidpersistentpediatria@gmail.com