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Association Internationale des
Centres Hyperbares
Francophones

Geneva, May 7, 2020

The International Association of Francophone Hyperbaric Centres (ICHF) Position Statement on resuming professional diving activities within the context of the coronavirus SARS-Cov-2 (COVID 19) pandemic.

The coronavirus SARS-Cov-2 (COVID 19) pandemic has held sway for several weeks in our countries at differing stages of evolution. While it is just starting in certain countries, it seems to be regressing in a few countries.

However, the virus has not been eradicated; no vaccine has been found so far; there is not as yet an efficient treatment; the majority of the population is probably not immune... Thus it is essential to continue efforts towards limiting the propagation of the pandemic by maintaining barrier precautions (social distancing, regular hand washing-disinfection, wearing a mask...) until a solution has been found. These precautionary measures are recommended in most countries when lockdown is over. We have to adapt them to the specific requirements of companies working in a hyperbaric environment, after analysing the risks of contamination and testing them via simulation.

These recommendations only concern medical aptitude to intervene in a hyperbaric environment during a Covid-19 pandemic. They take into consideration the latest scientific data, experts' advice but also the difficulty to have access to medical imaging devices and functional examination because of a great demand and barrier precautions. These recommendations are aimed at occupational health physicians who are solely responsible for making decisions regarding aptitude for operations in a hyperbaric environment. They provide answers to a certain number of questions: Who can dive immediately, without a previous medical check-up and with no restrictions? On the contrary: what delay to respect? Which medical check-up? By whom? Which specific clinical examination? Which paraclinical check-up? And possibly any restrictions? A descriptive form allows all physicians to communicate disagreements coming up from home base data. These recommendations could be adapted at all times with regard to the descriptive forms, validation of serological tests and/or the evolution of scientific data. They also have to be adapted to work stations.

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We can divide the population of workers into 4 categories:

I. **« Non-suspect » :**

A worker who has not been ill (no sick leave for an infectious syndrome since January 2020) or has had no symptoms of the illness and has had no close contact with a COVID+ patient.
The worker can immediately resume diving activities or hyperbaric exposure – after completing a medical questionnaire (self-assessment) aimed at confirming that he is or has not been infected by Covid19 (Annex 1). This questionnaire must be filled in before each intervention. Use of the questionnaire and its exploitation are the responsibility of the occupational health physician. The physician may have to interview the worker to obtain additional information via teleconsultation or an in-person medical consultation.

Screening test by PCR and /or serology is not recommended systematically for the time being. It may be applied on a case per case basis following a medical decision if there is the slightest doubt and in certain exceptional situations where barrier measures are difficult and/or prevent quick extraction with immediate medical care. In this case, a 14 day confinement may be prescribed followed by a second screening test.

Immediate return to work

II. **« Asymptomatic Suspect » :**

Asyptomatic worker, having had close contact* with a COVID+ patient and/or with positive screening (PCR+).
The worker may be contagious. He has to be isolated for 15 days after contact and/or positive screening. Isolation could be shortened for the contact case after one or several negative screenings tests and only after a medical decision.

Return to work is possible after respecting the period of isolation and filling in a self-administered medical questionnaire (annex1) coupled with self-evaluation for effort (annex 2) so as to eliminate respiratory impairment due to an asymptomatic pulmonary infection. The occupational health physician is responsible for these evaluations. This physician organises a medical teleconsultation or an in-person medical consultation before allowing the worker to return to interventions in a hyperbaric environment. In the slightest doubt, referral for a specialist's advice may be required and/or additional examinations.

A medical prescription for a PCR and/or serology test must be done in the slightest doubt.

Return to work in hyperbaric environment after isolation period and/or one or more negative controls by PCR.

* *« A close contact is a person who, 48h preceding the appearance of symptoms for a confirmed case, has shared the same living space (for example : family, same room) or had direct contact with this person, face to face less than a meter apart or for more than 15 minutes during a discussion ; flirting ; intimate friends ; immediate school or office neighbours ; prolonged exposure during public or private transportation ; care person for a confirmed case or laboratory personnel manipulating biological samples of a confirmed case without adequate protection ».*

III. **Symptomatic but no serious symptoms :**

The worker has contracted the illness in its simplest form (fever, cough, +/- short of breath...) without ever being oxygen-dependent or being admitted to a hospital for pulmonary, cardiac, neurological and /or nephrological complications.

The worker is re-evaluated by the occupational health physician. Return to work in hyperbaric environment interventions is only possible after an in-person medical consultation which involves in particular:

- The medical questionnaire, should focus especially on the cognitive, respiratory, cardiac, nephrological, neurological, digestive and general conditions.
- A test to detect exertional dyspnea (6 minute walking test, Luc Leger shuttle test, 3 minute step test...) measuring SpO2 (pulse oxymetry) (Annex 3).
- Physical medical exam.
- Medical workup (CBC, CRP, creatinine with GFR calculation), an ECG (to detect rate of heartbeat disorders or other disorders...) and a spirometry test (to detect a ventilatory disorder so far undisclosed) can additionally be done.
- A Low dosed thoracic CT scan can be helpful considering there may be lung damage despite a normal clinical examination., indicated in the presence of an effort saturation level <92%.

If in doubt, the physician can consult a specialist and/or supplement his workup according to the symptoms, with for example:

- a pulmonary function test (PFT) with DLCO
- and/or a VO2 max or as an alternative : a stress echocardiography with SaO2 or an ECG stress test with SaO2 and an echocardiography at rest

Return to work is indicated 1 month after the symptoms have ceased but there can be case by case discussion considering results of the prescribed clinical and paraclinical exams.

Temporarily unfit to work for a minimum of 4 weeks

IV. **Symptomatic and severe :**

The worker was admitted to hospital for pulmonary, cardiac or other symptoms, requiring oxygen supplementation (oxygen dependent) with or without mechanical ventilation.

Experience acquired over the last few weeks shows that these patients have experienced an intense physiological stress and require a long convalescence. Special attention should be paid to determining cardio-pulmonary sequelae (myocarditis, pulmonary embolism, pulmonary fibrosis...), kidney dysfunction and neuro-psychiatric disorders.

The occupational health physician usually proposes a return to work consultation about 6 months after symptoms have ceased. However there can be case by case discussion considering results of the prescribed clinical and paraclinical exams.

Temporarily unfit to work for a period of 6 months

For these 4 categories, when it is possible to go back to work, this return should be progressive and include setting up barrier measures and optimizing decontamination procedures for material. In the slightest doubt, the occupational health physician and the hyperbaric safety director must be informed.

These recommendations are based on current knowledge regarding this infection. They will be updated in keeping with the evolution of science and technology.

Recommendations expressed by the general assembly of 04.30.2020

Sign by ICHF board :

Dr R Pignel (Genève, Ch), Dr D Buteau (Levis, Canada), Dr M Coulange (Marseille, Fr), Dr M Gelsomino (Bales, Ch), Dr T Joffre (Lyon, Fr), Dr C D'Andréa (St Pierre de la Réunion), Dr JJ Albertini (Avignon, Fr),

and :

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(84 diving and hyperbaric physicians)

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7 Scientific Societies

Association réunionnaise de médecine subaquatique et hyperbare (ARESUB),
Conseil Belge de l'oxygénothérapie hyperbare (ACHOBEL)
Faculté des sciences du sport, Lab. ORPHY, Université Européenne de Brest
Institut National de la Plongée Professionnelle (INPP)
Laboratoire de physiologie environnementale intégrée, Haute Ecole de Bruxelles-Brabant (HE2B)
Société Belge de médecine hyperbare et subaquatique (SBMHS-BVOOG)
Société de médecine et de physiologie subaquatique et hyperbare de langue française (MedSuHyp),
Société Suisse de médecine subaquatique et hyperbare (SUHMS),

29 hyperbaric centres :

Unité de médecine hyperbare de CHR d'Angers (France)
Chambre hyperbare de l'hôpital universitaire d'Anvers, (Belgique)
Centres hyperbares de la protection civile algérienne (Algérie)
Centre d'oxygénothérapie hyperbare de la polyclinique Urbain V d'Avignon (France)
Centre hyperbare de Bâle (Suisse)
Centre de Médecine Hyperbare de Bordeaux (France)
Centre hyperbare de l'hôpital militaire de Bruxelles (Belgique)
Centre hyperbare hôpital Farah Abidjan (Côte d'Ivoire)
Unité de médecine subaquatique et hyperbare des Hôpitaux Universitaire de Genève (Suisse)
Service de réanimation hyperbare du CHRU de Guadeloupe (France)
Unité fonctionnelle de médecine hyperbare et plaies et cicatrisation du CH de St Pierre de La Réunion (France)
Consultation de médecine subaquatique et hyperbare du CHUV de Lausanne (Suisse)
Service de médecine hyperbare, centre médical et d'expertise de la marine de Limbe (Cameroun)
Hopitasuisse hyperbaric Care, Service de médecine hyperbare de Lugano (Suisse)
Service de médecine hyperbare de l'Hôtel-Dieu de Levis (Québec),
Centre régional d'oxygénothérapie hyperbare (pole réanimation) hôpital R Salengro, Lille (France)
Centre de médecine hyperbare de l'hôpital E Herriot de Lyon (France)
Service de médecine hyperbare, subaquatique et Maritime du CHU de Marseille (France)
Unité de médecine subaquatique et d'oxygénothérapie hyperbare du CHRU de Martinique,
Centre hyperbare de l'Hôpital Sacrée Cœur de Montréal (Canada)
Unité de traitement par Oxygène Hyperbare de Nice (France)
Unité de médecine hyperbare de l'hôpital d'Ottawa (Canada)
Caisson Hyperbare-réanimation médicale de l'hôpital r Poincaré de Paris – Garches (France)
Unité du caisson hyperbare du Centre Hospitalier de Polynésie française - SU-SAMU (Tahiti)
Centre de médecine hyperbare de la clinique St Pierre de Perpignan (France)
Centre régional d'oxygénothérapie hyperbare d'Alsace, hôpital de Hautepierre, Strasbourg (France)
Service de médecine hyperbare, expertise plongée de l'hôpital d'instruction de armées St Anne de Toulon (France)
Centre de médecine hyperbare du CHU de Toulouse (France)
Service d'oxygénothérapie hyperbare de l'hôpital militaire principal d'instruction de Tunis (Tunisie)

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Appendix 1 and 2: self-administered medical questionnaire

Self-administered medical questionnaire for professional diving and hyperbaric environment workers in the context of COVID-19 pandemic

Conditions for resuming work in a hyperbaric environment or in professional diving should take into account the possibility of persistence of virus circulation in the population and the eventuality of asymptomatic carriers. We also know that pulmonary damage and also cardiac damage (10-20 % of the cases) can persist, even in patients with no or few symptoms or presumably healed.

There is a risk for pulmonary fibrosis sequelae not yet well defined in their intensity and long-term recovery. Dysrythmias occurring during physical exercise with an increased risk for cardiac sudden death can also be associated with COVID-19 cardiac involvement. The impacts of hyperbaric exposure for patient with these two conditions is not yet well documented.

This questionnaire is divided in 2 sections. The first section, which is validated by the French Society of Anaesthesiology, is aimed at identifying the workers who might have contracted the virus or might have been in contact with an infected individual. The second section, which can be used only for physically active workers, allows to identify a possible physical effort limitation.

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Screening for suspect or symptomatic cases			
In the event of a positive answer, working in a hyperbaric environment is discouraged without a medical advice. This questionnaire should not be transmitted to the employer under any circumstances.	YES	NO	COMMENTS
In the last 15 days, have you or someone close to you experienced :			
Body temperature ≥ 38°C			
Chills			
Muscular pain			
Extreme fatigue			
Unusual headaches			
Sore throat			
Runny nose, sputum			
Taste and/or smelling loss			
Loss of appetite			
Chest pain			
Coughing			
Unusual shortness of breath			
Abdominal pain and/or diarrhea			
Other symptoms and signs			
Have you been :			
Tested positive for Covid-19 ?			
In close contact[1] with a Covid-19 positive individual or someone showing some of the symptoms listed above?			
[1]*A close contact is a person who, in the last 24h preceding the apparition of symptoms in a confirmed case, has shared the same living area or has been in direct contact with this confirmed case (closer than 1 meter for more than 15 minutes).*			
Additional comments :			

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Screening for an impaired exercise tolerance ***(This questionnaire is only valid for workers who are physically active or very physically active. If not, one must look for similar symptoms during a moderate level of exercise and/or one should ask for a medical advice)***			
In the event of a positive answer, working in a hyperbaric environment is discouraged without a medical advice. This questionnaire should not be transmitted to the employer under any circumstances.			Comments or description
Have you been recently physically active / did you continue your usual physical activities or training?			
Doing so, did you experience unusual fatigue?			
Avez-vous ressenti une gêne respiratoire Did you experience any respiratory limitation or unusual shortness of breath?			
At rest			
With moderate exercise (walking)			
With sustained exercise (running)			
Can you run for 50 meters?			
Can you run up one staircase floor?			
Did you notice an unusual muscular fatigue?			
If you are under a regular medical treatment, did you notice that your medical condition was not as controlled as it should be? Did you feel the need to consult your treating physician?			

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Appendix 3 : Screening tests for exercise tolerance

These tests should permit detection of a cardio-pulmonary involvement. The transcutaneous haemoglobin saturation level (pulse oxymeter), the cardiac rate and the respiratory rate are monitored via the pulse oxymeter.

Any desaturation ($SpO2 < 94\%$ or a drop of more than 5% from the initial saturation level) or any excessively rapid pulse or respiratory rate should mandate additional clinical and paraclinical tests.

6 minute or 3 minute-walking test

6 minute or 3 minute-step test

MVV (maximum Voluntary Ventilation) Test

Flack's test

CAT Questionnaire : https://www.catestonline.org/patient-site-test-page-french-france.html

…

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ANNEX 4: report card

Recommendations for good practice in occupational health management for workers in hyperbaric environment

This collection form concerns:

☐ A proposed amendment or updated recommendation

☐ Feedback from fielded experience (applicability, feasibility, implementation)

Recommendation 1

The aim of the medical examination of the employee working in hyperbaric environment is to look for and identify anatomical, and physiological situations or diseases that could increase professional risks. It must be the occasion of a reminder of the primary prevention rules by the doctor.

Proposal / informations

Text :

Arguments :

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Bibliographic References : 1. 2. 3. ….
Author :

Names: Fonction : Affiliation :	Adresse : Phone : e-mail :

Date d'établissement de la fiche :

Cette fiche est à retourner par courrier électronique à ichf@hcuge.ch

L'ensemble des fiches reçues fera l'objet d'une révision régulière des recommandations par le Conseil de l'ICHF qui sera publiée le plus rapidement possible.

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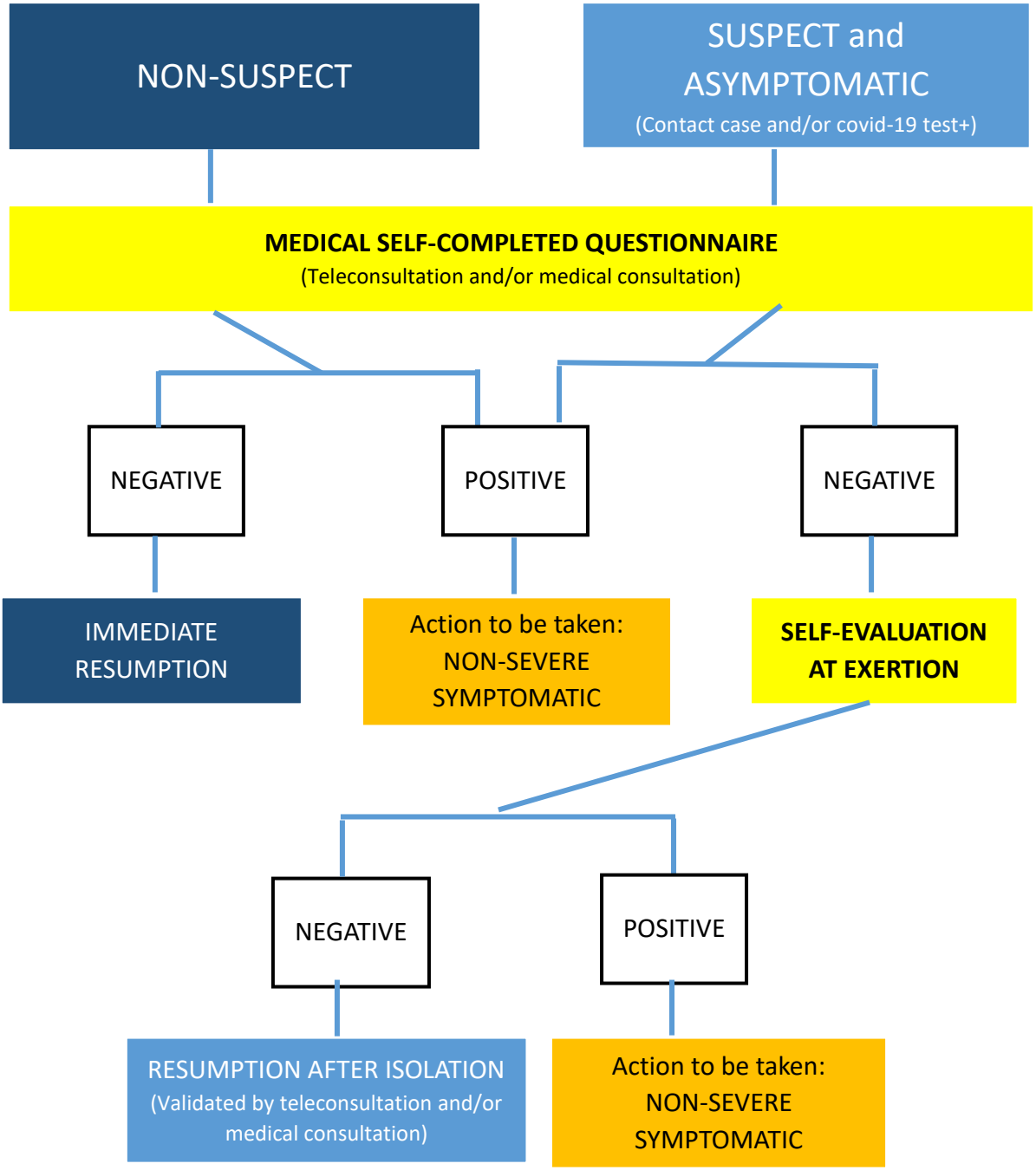
ANNEX 5: Decision algorithm

Non-symptomatic patient:



This management flowchart is under the responsibility of the occupational health physician or diving medicine physician who can, in the slightest doubt, request a teleconsultation and/or an in-person medical consultation.

In all cases, return to work should be progressive and associated with the implementation of barrier protective measures and optimization of decontamination of all equiments (including IPE)

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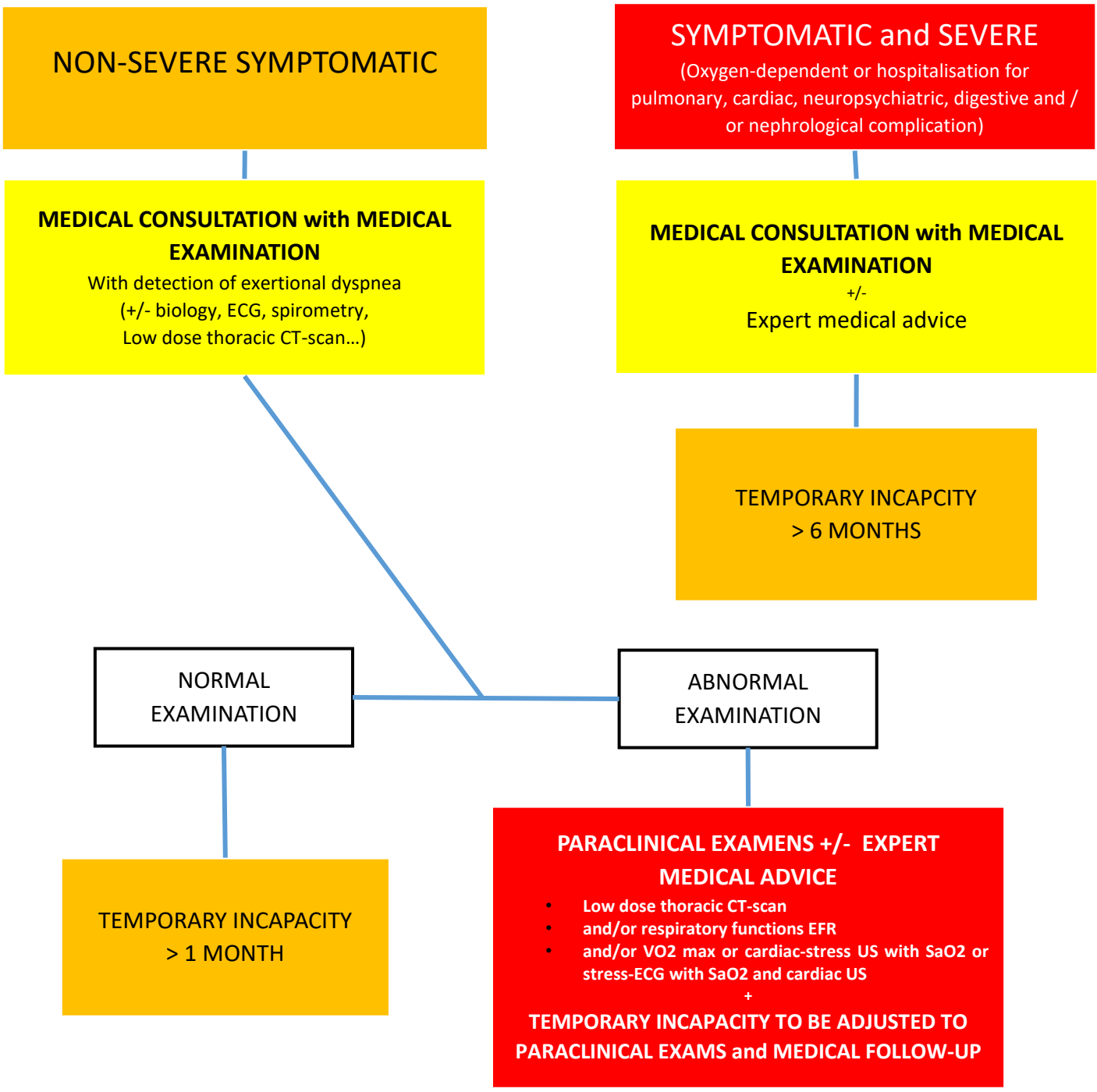
Symptomatic patient:



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