COVID-19 Guidance for Medical Referees – May 2024

This revision takes into account the evidence currently available including the reported outcomes from the Health and Safety Executive's guidance for working divers (1) on return to diving after COVID-19. It is designed to minimise risk while avoiding restrictions and medical investigations that would deter divers from declaring issues that require assessment.

Background

To date, UKDMC has adopted a conservative approach in order to accommodate the gaps in the evidence base relevant to diving after COVID-19.

At the UKDMC conference on 4 November 2021, a presentation by DDRC Healthcare, and subsequent discussion including Dr Steve Forman representing the UK Health and Safety Executive, concluded that:

• lung lesions occur in a significant proportion of cases of symptomatic and asymptomatic COVID-19
• many other viral infections of the lung cause similar lesions but infections other than
COVID-19 do not require additional investigations or precautions beyond those justified on clinical grounds.
• the risk of pulmonary barotrauma arising from these lung lesions has not been quantified
• there have been no cases of pulmonary barotrauma reported in individuals who have returned to diving after COVID-19 in accordance with the UK Health and Safety Executive's guidance for working divers

In view of these observations, the UKDMC guidelines were relaxed by aligning them more closely with the HSE guidance on return to diving after COVID-19

Following this, on discussion at the Diving Medicine conference in November 2023, it was noted that the risk of harm from COVID-19 had reduced over time and that there had been no reports received regarding potentially relevant lung problems in divers who had not required hospitalisation, had returned to diving when their symptoms had resolved and they had regained their original level of physical fitness. In particular, there have been no reports to suggest increased incidence of barotrauma in those divers. It was therefore agreed that divers who have had COVID-19 and have returned to their usual level of fitness, but have not required hospitalisation, no longer need to declare this on the UKDMC Recreational Diving Medical Declaration form, do not need to contact a Medical Referee and could return to diving as soon as they have returned to their previous acceptable level of fitness. Divers with severe symptoms that required hospitalisation also need to have returned to their previous level of fitness, are likely to require at least a three month

lay-off and still need to declare this on the form and contact a Medical Referee (see below re likely investigations required).

Guidance notes.

1. In the early stages of the pandemic it was noted that divers who have no known exposure to SARS-CoV2 and had no symptoms of COVID-19 may still have suffered asymptomatic disease which can be associated with damage to the lungs (2), heart and other organs which could lead to injury or death whilst diving. This also applies to those with mild to moderate symptoms. However, this risk is low, should resolve over time and is unlikely to be the case if an individual has returned to their previous level of fitness. The previous recommendation of a one month lay-off from diving post asymptomatic but positive testing or mild symptoms lasting 7 days or less, or a two month lay-off for those with moderate symptoms or with symptoms lasting for more than 7 days has been removed and a diver may return to diving without having to answer yes on the UKDMC Recreational Diver Medical Declaration form and without having to contact a Medical Referee.

2. Contacts of known COVID-19 cases should follow the current guidance on testing and self-isolation. Undertaking medicals and /or invasive testing on all divers would be impractical and the risk is deemed to be low. There is no restriction on diving for individuals with no symptoms who do not have a positive diagnosis of COVID-19.

3. In one study clinical symptoms and signs did not predict lung involvement visible on Low Dose CT, but age greater than 54 years and diabetes were risk factors for more extensive lung involvement, and rhinitis and anosmia appeared to protect against lung involvement (3). Several studies have reported that lung lesions are visible on CT imaging in similar proportions of patients whether they have asymptomatic, paucisymptomatic or mild to moderate disease. Case series have shown abnormalities persisting for at least 14 days after onset of symptoms in patients who did not have severe respiratory distress or require oxygen at any time (4). Lesions visible in a significant proportion of asymptomatic to moderate cases have resolved completely within 2 to 3 weeks (5).

4. Neurological deficit and cognitive impairment have been associated with COVID-19, more usually in illness severe enough to require hospitalisation, and must also be considered (6, 7, 8). The diver can then be assessed as indicated below provided they are back to their previous level of aerobic fitness and have recovered neurologically and cognitively.

5. Divers with severe symptoms are likely to undergo a structured programme of follow up (9) and, if there is objective evidence that lung lesions have resolved, then a return to diving can also be considered for this group

provided the candidates are back to their previous level of aerobic fitness and have recovered neurologically and cognitively.

Referee Consultation Guidance

Divers with severe symptoms requiring hospitalisation will need to have returned to their previous level of fitness. It is only these divers that will require more comprehensive chest imaging and possibly laboratory-based lung function testing, including assessment of residual volume. This is expensive and currently not available due to capacity issues within the NHS. It is however possible that these patients will have such tests undertaken as part of their post COVID-19 follow up from their hospital team.

In addition they will require the following assessments by the Medical Referee –
A careful history should be taken. Where the history is consistent with ongoing respiratory, cardiac or cognitive symptoms or other unresolved issues that impact adversely on diving safety, the diver is unfit to dive. If the diver has returned to their previous level of physical fitness and cognitive function, a medical examination should be carried out per existing guidelines with the following additional tests recommended:

a) Pulse assessment for 15 to 60 seconds (10) and at least long enough to determine if there are frequent ectopic beats. If frequent ectopic beats are detected or if the history indicates concerns such as palpitations, an ECG should be performed. If the ECG shows frequent ventricular ectopic beats or evidence of repolarisation changes (ST segment or T wave changes) or LBBB, the diver should be referred to a cardiologist for further investigation which should include an echocardiogram.

b) An exercise test (such as the Chester step test) with oxygen saturation monitoring. Do not proceed if the resting saturation is lower than 96% (11). Comparison with previous exercise test results is useful (if available). A drop in O2 saturation of more than 3% on exercise or an unexpected deterioration in exercise capacity (estimated VO2 max) compared to previous values would preclude certification of fitness to dive. The test should be conducted and terminated as normal, but the result can only be accepted if the diver reaches and can maintain at least 7 METS (VO2 24.5ml/kg/min) for 2 minutes before reaching any criteria for termination. Using the Chester Step Test this would require completion of Stage V with a 15 cm step or Stage III with a 30 cm step (12).

c) Exclude any significant neurological or cognitive impairment.

Rationale -

Those who required admission to hospital with COVID-19 are at very high risk of lung changes which can persist. Wu et al (2021) followed up a population of non-smokers with history of hypertension, diabetes, cardiovascular diseases, cancer, asthma or

COPD with median age 60 years and median body-mass index 25·1 kg/m² who had severe COVID-19 but did not require invasive mechanical ventilation. Residual lung changes on CT were seen in 78% at 3 months after discharge and in 24% at 12 months. Length of hospital stay, peak HRCT pneumonia scores during hospitalisation, and requirement for High Flow Nasal Cannulae or Non Invasive Ventilation were associated with abnormal HRCT at 12 months after discharge (13).

Huang et al (2021) followed up a population of hospitalised COVID-19 survivors with pre-existing co-morbidities at 6 and 12 months after discharge (14).

Han et al found that approximately one-third of participants who had recovered from severe COVID-19 developed fibrotic-like changes in the lung within 6 months of disease onset. Older age (over 50 years), acute respiratory distress syndrome, and higher baseline CT lung involvement score (18 or more out of a possible score of 25) were associated with fibrotic-like changes in the lung (15).

Referee notes

It is anticipated that a Referee's clinical judgement and shared decision making with the diver will form a large part of the fitness to dive assessment, especially with regard to the known and unknown potential risks of diving post COVID-19. In particular, the relationship of the lung changes to pulmonary barotrauma and consequent decompression illness is not known.

Where a diver has been found unfit to dive, it is expected that appropriate explanation is given and follow up advised through the diver's primary or secondary care teams as appropriate. It is unlikely that a Referee would be best placed to arrange further investigations themselves as interpretation and follow up of results along with the current logistical issues of arranging such tests is complex.

Divers may seek additional reassurance of dive fitness through chest imaging or pulmonary function testing. It is important to note that while this may be feasible and a normal result reassuring, there are likely to be a proportion where abnormalities are found. Translating such abnormalities into barotrauma risk or knowing if further investigation is then appropriate (especially if large radiation doses or significant cost is involved) is very complex and this should be discussed with the diver in advance. The sensitivity and specificity of identifying those at risk of pulmonary barotrauma or other complications such as immersion pulmonary oedema using investigations such as desktop spirometry, peak flow measurements, chest plain films or CT imaging is currently unknown but these tests may be considered based on clinical judgement.

The Association for Respiratory Technology and Physiology (ARTP) suggests a range of tests including spirometry for clinical follow up after COVID-19 (16). This now need only be considered in those divers who required hospitalisation. Simple desktop spirometry will, however, be difficult to interpret in the absence of results

prior to exposure to, or infection with, SARS-CoV2. In one series FVC, FEV1, FEV1/FVC and mid-expiratory flows were in the expected range in the large majority of 110 patients at discharge. The only spirometry measurement that reached statistical significance in this series was FEF75% in the 19 patients who had severe pneumonia, of whom 5 had values lower than 65% of predicted (17). A review by Thomas et al (2021) concludes that spirometric indices appear to be generally well preserved, but that reductions in total lung capacity are commonly reported and a defect in diffusing capacity (DLco) is present in 20–30% of those with mild to moderate disease and 60% in those with severe disease and improves in most cases during a 3–6-month convalescent period (18). Spirometry is, however, simple, widely available and non-invasive so, although the information above suggests that an abnormal result is unlikely to be due to COVID-19, it would be a trigger for further assessment in any diver regardless of the underlying abnormality. It might also be useful as a baseline for follow-up of a candidate who has not yet fully recovered since objective evidence of further deterioration, instead of an improvement, would be a valuable prompt for the diver to seek advice from their general practitioner. When considering spirometry, ARTP guidance or other appropriate procedures for infection control should be taken into account.

According to the British Thoracic Society Guidance, follow-up chest x-rays are likely to be offered routinely to all patients who had abnormalities on imaging whether they were admitted to hospital or were assessed in hospital but then cared for in the community. Some of these patients will be discharged with a normal chest x-ray and others will proceed to more detailed investigation which will be useful when eventually reviewing fitness to dive. There will be some divers who lack objective evidence of resolution, such as those who are discharged from secondary care with “minor insignificant changes”, others who had symptoms but no imaging and asymptomatic divers with evidence of past infection. Although the radiation risk associated with a chest x-ray is low, there is currently no evidence regarding the significance of some of the lung abnormalities seen in COVID-19 on which to base clear advice for or against further imaging and its optimal timing, especially if abnormalities persist and repeat imaging needs to be considered. It is also worth bearing in mind that a chest x-ray might miss lesions related to COVID-19 that would have been identified by a CT scan (19). Where guidance already exists for an abnormality, such as pneumothorax, this should be followed. In other circumstances, the Medical Referee will either need to seek specialist advice or to make a decision on the requirement for further imaging based on an overall assessment of risk, taking into account factors such as the likelihood of infection with SARS-CoV2, the nature and severity of symptoms and the type, distribution and number of lesions last shown on imaging.

Review of Guidelines

This guidance is based on current understanding at the time of writing, but all Medical Referees should continue to remain up to date with latest data on COVID-19.

The references below have been used in the development of these guidelines and may form a useful adjunct for clinical decision making and discussions with divers. The committee will review this document at least every 3 months or earlier if important new evidence becomes available. If you find any new information that you think is relevant, please let the committee know via http://www.ukdmc.org/contact-us/.

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