

LABORATORY TESTS FOR COMPLETION IN PATIENTS WITH CONFIRMED COVID-19



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Version: 1.6

Issue Date: 22/03/2020

Review Date: March 2022

Introduction:

International experience of patients with COVID-19 suggest high rates of some complications we do not encounter particularly frequently, even within critical care. Acute deterioration of patients with COVID-19 is usually either due to a secondary bacterial infection, or is a consequence of one of these conditions:

- 1) Myocarditis – leading to malignant dysrhythmias and cardiogenic shock
- 2) Haemophagocytic lymphohistiocytosis (HLH)-like illness – causing multiorgan failure
- 3) Cytokine storm – causing multiorgan failure
- 4) Diabetic ketoacidosis, even in non-diabetic patients

As a result, there is a need to routinely review biological markers which are not regularly assessed in the critically ill population. There is a new daily results chart to accompany this SOP, available on the S:drive – Critical Care – COVID Clinical Documents – COVID paperwork – Covid Daily blood results v3.

Welsh Clinical Portal “Request set” Panels:

For ease of testing there are a number of pre-defined testing panels established on Welsh Clinical Portal (WCP) for Critical Care. 2 panels have now been created for use with **confirmed Covid-19 positive patients**. For all **requests, please ensure that the “reason for request” states “Covid-19 positive”**, to ensure the laboratory staff can safely process the tests.

- 1) **“UHW General Critical Care Covid Admission Profile”** consists of:

Full blood count

Coagulation screen + quantitative D-dimer

Electrolyte profile, liver function test (including AST), bone profile & magnesium

Lactate dehydrogenase

Creatine kinase

Ferritin

High sensitivity troponin I

Serum ACE

Random glucose

Non-directed bronchial lavage – for microscopy, sensitivity & culture

Blood cultures

HIV serology

This panel should be performed for **all** patients with **proven Covid-19** infection, requiring organ support. It is acknowledged that the Covid-19 status may not be known for all patients receiving Critical Care input. In cases where the Covid-19 status is **unknown initially, wait until positive result is obtained before requesting this set**. It is imperative that during this predicted time of high patient numbers we do not unnecessarily overwhelm the laboratory services. The admission panel should be **marked as "Urgent" to ensure all tests are processed out of hours**. An **extra yellow top bottle** is required to enable ferritin testing.

2) "UHW General Critical Care Covid Profile (Mon, Wed, Fri)

Full blood count

Coagulation screen + quantitative D-dimer

Electrolyte profile, liver function test (including AST), bone profile & magnesium

Lactate dehydrogenase

Creatine kinase

Ferritin

High sensitivity troponin I

Random glucose

This panel should be performed for all Covid-19 positive patients every Monday, Wednesday and Friday, unless their admission profile has already been completed that day.

For test requests on **Tuesday, Thursday, Saturday and Sunday**, bloods should be requested as per usual: either "**UHW General Critical Care Daily Profile (Non-haemofilter Tues, Thurs, Sat, Sun)**" if patient is not currently receiving renal replacement therapy; or "**UHW General Critical Care Daily Profile (Haemofilter Tues, Thurs, Sat, Sun)**" if renal replacement therapy is ongoing.

Further Regular Tests Required:

- It is not possible to add serum ketones to the testing panels due to the frequency of laboratory testing of these (weekly). Due to the risk of diabetic ketoacidosis in patients with Covid-19 infection **ketone measurement should be performed daily, even in non-diabetic patients**. This should be achieved through **point of care testing** and can be done by trained nursing staff.
- **UHW General Critical Care Covid Day 7 panel** – this should be performed on **day 7** of ICU admission, and **weekly thereafter**, if respiratory failure is ongoing. This includes **quantitative D-dimer testing and mycology sampling (on NBAL and serum)** to help guide further management. This panel must be sent in addition to the daily blood panel for the day.

AS WITH ALL SAMPLES, PLEASE ENSURE THESE INVESTIGATIONS ARE DOUBLE-BAGGED AND IDENTIFIED WITH A "HIGH RISK" STICKER BEFORE BEING SENT TO THE LABORATORIES.

Additional Notes:

Troponin (high sensitivity)

- Troponin rise in Covid-19 is thought to be a prognostic indicator.
- A significant rise in HSTnI should prompt:
 - o ECG
 - o Transthoracic echocardiogram request
- Consider use of dual antiplatelet therapy only if HSTnI rise in association with regional ECG changes +/- new regional wall motion abnormality on transthoracic echocardiogram which are deemed more likely secondary to coronary artery disease than myocarditis. If unsure, contact Cardiology team for review and advice.

Ferritin

- Ferritin is an acute phase reactant, therefore we would expect it to rise in the critically ill.
- It is not a routine investigation in Critical Care.
- For **all panels including ferritin requests** (i.e. admission, and Monday/ Wednesday/ Friday testing) an **extra yellow top bottle is required**.
- **Ferritin levels > 4,000µg/L** is a trigger for investigating further for the development of secondary HLH. Such levels should **prompt the addition of a lipid profile**, with an expectation of hypertriglyceridaemia (triglycerides > 3mmol/L). Coagulation testing in patients with HLH usually reports fibrinogen < 1.5 g/L.
- For **ferritin > 4,000µg/L** consider H-scoring and **referral to Dr Ernest Choy, Dr Stephen Jolles or Consultant Haematologist** for discussion regarding immune modulation therapy.
- All ferritin results > 4000µg/L should be telephoned directly to the ICU Consultant on bleep 5490 by the laboratory staff.

Non-directed bronchial lavage

- The primary purpose of this is to assess for secondary bacterial infection.
- There is no ability within our laboratories at present to perform SARS-CoV-2 viral load testing currently.
- NBAL should be repeated during admission if there are clinical concerns of a possible ventilator-associated pneumonia

Procalcitonin

- International data suggests the use of procalcitonin monitoring to aid in the differentiate causes of acute deterioration in patients with Covid-19. Elevated levels suggestive of secondary bacterial infection.
- Suggested reference ranges are:
 - o <0.25 µg/L Bacterial infection is unlikely
 - o 0.25 – 0.49 µg/L Bacterial infection is possible
 - o ≥0.5 µg/L Systemic bacterial infection is possible