Intensive Care Society of Ireland

Guidance document for the Intensive Care Management of the adult patient with confirmed or suspected COVID-19

To be read in conjunction with:

The WHO Document: *Clinical management of severe acute respiratory infection when novel coronavirus (COVID-19) infection is suspected*.
https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected

HSE Acute Operations: Feb 7th 2020
Guidance- Management of the critically ill adult patient with COVID-19 infection

HPSC Guidance documentation: Interim Infection Prevention & Control Precautions for possible or confirmed novel Coronavirus available at: https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/

Introduction

This is an early version of this document and it is likely to be updated over time as more information about COVID-19 comes to hand. This document refers to the critically ill adult patient and is intended to be a *Clinical Advisory* document – for extra operational guidance, please refer to the HSE Acute Operations document as referenced above.

Although there every effort should be made to identify patients likely to have COVID-19 disease as quickly as possible, it is important to accept that there remains some possibility that a patient could present with atypical features or with gaps in clinical history. Therefore, an important part of preparation is to reinforce adherence to Standard Precautions for all patients all of the time. The most important elements of protection against transmission of any respiratory virus are likely to be scrupulous adherence to hand hygiene, cough etiquette and respiratory hygiene. Refresher training on hand hygiene and other key elements of Standard Precautions should be provided to and availed of by healthcare workers (HCW) working in ICU at this time.

Initial points:

- There is no proven specific treatment or vaccine for COVID-19. Therefore, all clinical care is supportive in nature at this time.
- Spread is by **Contact and Droplet** transmission, similar to many other respiratory viruses. These refer to the larger respiratory droplets created by coughing or sneezing and thus are unlikely to be spread over longer distances. Acquisition of this virus from brief casual exposure in an area (such as a ward) where they are cared for, but without physical contact or unprotected exposure within one metre/three feet distance is very unlikely: (*Note: the generally accepted distance for dispersal of droplets in most international guidance is 1 m however that when assessing possible contacts, a distance of 2m is often used to add a margin for safety in assessing distance*).

  Airborne transmission through infectious aerosols (such as with *M. tuberculosis*, measles or chickenpox) represents a higher level of risk than droplet transmission, because the risk extends to the entire shared air space (for example the entire unite or ward, if the patient is not in an

enclosed space). Standard surgical masks do not provide adequate protection against aerosol transmission.

- Each hospital should have a predetermined clear understanding of where such patients can be best managed, both at a ward level and at a critical care level (this is likely to be similar to the management of Influenza patients). The ICU clinician is well-placed to input into this process.
- It is essential that there are adequate numbers of HCW on duty, to support adherence to infection prevention and control (IPC) precautions when caring for critically ill COVID -19 patients and in particular to minimize the risk of lapses in IPC precautions due to HCW distraction or fatigue.
- The ICSI supports reserving ICU/HDU beds for the critically ill COVID-19 patients only. Utilisation of ICU/HDU beds for isolation purposes alone has no clinical basis and potentially adversely affects the care of other critically ill patients.

Critical Care Management

General Information:

Early information suggests that the main critical illness manifestation of COVID-19 is severe acute respiratory infection (SARI) leading to respiratory failure. Reports of primary cardiac and renal failure are more likely to be secondary events to the SARI.
ARDS may develop secondary to the pneumonitis and can be categorized as mild, moderate or severe, as per the Berlin Classification. Sepsis and septic shock are also described as part of a Multi-Organ Failure syndrome (MOF). The China CDC publication of Feb 11th 2020 suggests a pattern of disease of: 80.9% Mild, 13.8% Mild and 4.7% Severe.

Immediate Implementation of Infection Prevention and Control (IPC) Measures*

- Critically ill patients who are likely to require procedures that generate aerosols should be cared for in a room with appropriately-controlled ventilation (negative pressure or neutral pressure room NOT positive pressure). However, where such a room is unavailable, a single room without controlled ventilation may be used – the door of which should remain closed.
- Aerosol generating procedures (AGPs) include;
    - Intubation, extubation and related procedures (e.g., manual ventilation and open suctioning)
    - Tracheostomy & tracheostomy procedures (insertion, open suctioning/removal)
    - Non–invasive ventilation (NIV) (e.g., BiPAP & CPAP)
    - High frequency oscillatory ventilation (HFOV)
    - Induction of sputum
    - Bronchoscopy
- Isolation signage should be placed at the entrance to the room to restrict entry and indicate precautions required.
- A record of all HCW in contact with a patient must be maintained - the number of HCW in contact with the patient should be kept to the minimum
- Where possible, use single use/disposable equipment or dedicate patient care medical devices to single patient use (e.g., stethoscopes). To minimize risk of disturbance of concentration & risk of contamination of the item, staff should not bring mobile telephones or pagers into the patient's room.
- Patient chart/records should not be taken into the room. For Electronic Health Records a designated workstation should remain in the room with the patient.
- All waste in the isolation room should be disposed as Category B waste – healthcare risk waste (otherwise known as clinical/infectious waste)

- Refer to HSE-HPSC IPC guidance for information on cleaning/decontamination of equipment and the environment.

*Refer to most recent version of HSE-HPSC Interim IPC precautions for Possible or Confirmed 2019 novel Coronavirus, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and Avian Influenza A in Healthcare Settings

Personal Protective Equipment (PPE)

- To be worn by **ALL** staff and visitors entering the room where a suspected, or confirmed case is being cared for
- An adequate supply of alcohol-based hand rub must be available outside and inside the patient's room
- PPE should be available outside the patient's room for donning prior to room entry
- A buddy system to observe donning and doffing of PPE is recommended
- In addition to standard precautions, the following PPE for **contact and droplet** precautions should be used by all HCW involved in patient care:
    - Disposable long-sleeved gown
    - **Surgical mask - secure ties/straps to middle back of head and neck. Fit flexible band to bridge of nose. Fit snug to face and below chin
    - Eye Protection – goggles or visor adjusted to fit
    - Gloves – pull glove wrist over the gown cuff
- For aerosol generating procedures <u>put on a minimum of a FFP2 respirator instead of surgical mask and fit check.</u>

***Given that an accidental disconnection or extubation (AGPs) can occur at any time in ICU it can be argued that a FFP2/3 should be worn at all times.*

Point-of-Care Testing

If point-of-care blood gas analysis is necessary to manage critically ill patients;

- Blood sampling should be kept to a minimum to reduce the number of door openings. The operator should strictly adhere to standard, contact and droplet precautions throughout the blood sample collection at the patient's bedside.
- The needle should be removed and disposed of safely and the adaptor applied to the tip of the syringe. If air must be expelled from the sampling syringe this should be performed in the patient care zone with the syringe pointing away from the operator .
- Remove PPE and decontaminate hands on leaving the patient room. Apply clean gloves and transfer sample to a clean disposable tray and take sample to the blood gas analyser. Dispose of the tray as healthcare risk waste
- The analysis of the specimen may be performed as normal, using standard precautions. The residual blood in the syringe should be discarded, as per standard practice and the instrument and its surroundings should be cleaned/disinfected after use.

Management of Hypoxic Respiratory Failure and MOF

- There is no clear contra-indication to non-invasive ventilation (NIV) or high flow nasal O_2 (HFNO). Well-fitting nasal interfaces and facemasks are less likely to create dispersion of exhaled air than previously thought. However, it is reasonable to forego NIV/HFNO and proceed to intubation based on clinician preference. Note that NIV is considered an aerosol generating procedure (AGP) and therefore represents an increased risk from an infection prevention and control

perspective. Patients should be placed in a negative pressure isolation room and HCW should wear a minimum FFP2 mask (respirator) when caring for patients requiring NIV.

- In that context, trials of NIV/HFNO should be closely monitored by senior staff at all times, as these are considered high risk patients who may deteriorate rapidly to the point of requiring intubation. *See intubation guidelines below.*
- Standard protective ventilation should be delivered (tidal volumes 6 ml/kg limiting plateau airway pressures <30 cmH2O).
- The ventilator should be set up with closed circuit suctioning and high efficiency filter (e.g. BS EN 23328-1). Avoid water-based humidification and use a HME filter instead. Minimise circuit breaks and AGPs (e.g., keep bronchoscopy to a minimum)
- Proning is potentially beneficial but is labour-intensive, and needs to be taken context with the concept of reducing staff/patient interactions, ET tube dislodgment etc.
- Standard approach to ARDS patients applies:
  - Early 24-hour NMDR infusion if required
  - Appropriately set PEEP (ARDSnet algorithm)
  - Nitric Oxide maybe helpful if available but minimise circuit interruptions
  - ECMO – as per advice/opinion of the Mater ECMO team
- The treatment of any form of shock related to SARS-CoV-2 (COVID-19) should be along the lines of the Surviving Sepsis Campaign. There is no contra-indication to CVC or arterial line insertion to facilitate the use of vasoactive infusions
- Acute kidney injury (AKI) should also be dealt in a similar fashion to standard ICU patients, including the option of continuous renal replacement therapy (CRRT). As with the general ARDS population, excessive volume administration should be avoided if possible
- The specific use of corticosteroids for viral pneumonitis (SARS/Influenza/MERS) has been associated with either harm, or no benefit, and thus cannot be recommended in COVID-19 patients (unless the steroids are required for a separate indication)
- Secondary bacterial infection or other viral (influenza or common respiratory virus) co-infections may co-exist, thus requiring the consideration of empiric antibacterials and/or antiviral therapy and should be guided by standard respiratory sampling, with advice on an appropriate empiric regimen to be sought from an infection specialist (e.g., clinical microbiologist or infectious diseases physician)

Intubation

- Keep number of HCWs present to a minimum. Intubation is an AGP and should be performed in a negative pressure isolation room or if unavailable, a single room with the door remaining closed
- The most experienced clinician available should perform intubation where possible.
- All HCW present should wear appropriate PPE for AGP
- Put on PPE before entering the patient's room:
  - Decontaminate hands
  - Put on disposable gown and secure with ties
  - Put on a FFP2 respirator and fit check
  - Put on eye protection – and adjust to fit
  - Put on gloves – pull glove wrist over the gown cuff
- Standard monitoring, vascular access, instruments, drugs, ventilator and suction checked
- Avoid awake fibre optic intubation, unless specifically indicated. Atomized local anaesthetic will aerosolize the virus. Consider Glidescope.
- Plan for rapid sequence induction (RSI) and ensure a skilled assistant able to perform cricoid pressure. RSI may need to be modified if patient has very high alveolar-arterial gradient and is

unable to tolerate 30s of apnoea, or has a contraindication to succinylcholine. If manual ventilation is anticipated small tidal volumes should be applied

- Five minutes of pre-oxygenation with oxygen 100% and RSI in order to avoid manual ventilation of patient's lungs and potential aerosolisation of virus from airways
- Ensure high efficiency hydrophobic filter interposed between facemask and Laerdal bag
- Intubate and confirm correct position of tracheal tube
- Institute mechanical ventilation and stabilize patient
- All airway equipment must be placed in sealed bag and removed for decontamination and disinfection
- Remove PPE, paying careful attention to avoid self-contamination

Removing PPE

In Patient's room	1. Remove gloves (avoid touching outside of gloves and dispose in healthcare risk waste) 2. Decontaminate hands 3. Remove eye protection from behind and dispose in healthcare risk waste 4. Remove gown(avoid touching the front of the gown) and dispose in healthcare risk waste
In ante room or directly outside patient's room Ensure door is closed	5. Grasp and lift mask ties from behind your head and remove mask/respirator away from your face. Avoid touching the front of the respirator and use ties to discard in healthcare risk waste bin. 7. Decontaminate hands

Considerations for the pregnant patient.

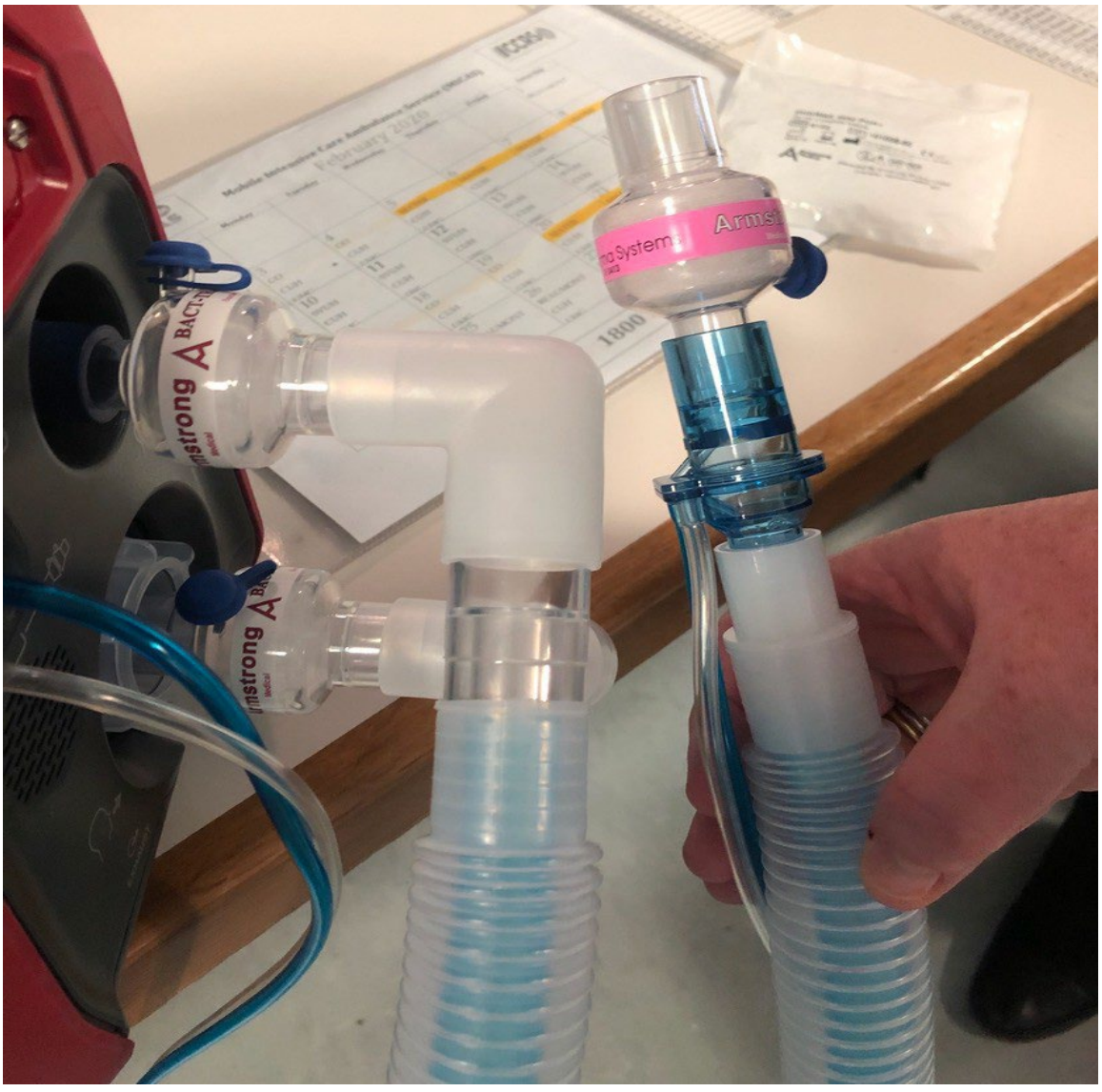
- Supportive therapies as described above should also apply to the pregnant patient, acknowledging the normal physiological/anatomical changes of pregnancy.
- Early delivery or termination planning is advised, based on the clinical information in its entirety. All such plans require a senior MDT process between ICM, ID and OBGYN.

Inter-hospital transfer of the Critically Ill COVID-19 patient.

- Occasionally it may be necessary to transfer unwell COVID-19 patients from one ICU to another. The primary reason should be for escalation of clinical care, but transfer may also occur for non-clinical reasons, such as inadequate isolation facilities at the referring unit
- Standard protocols for inter-hospital transfers apply to COVID-19 patients, with additional infection prevention and control precautions including use of appropriate PPE
- In the setting of critically ill patients requiring ICU-to-ICU transfer, the MICAS ambulance is to be utlilised in the normal fashion. Appropriate infection prevention and control precautions including use of appropriate PPE should be followed by all crew and appropriate ventilator tubing filters are in use to minimise viral dispersal. It is important to note that there is no formal scavenging system in the MICAS vehicles, so an additional filter on the ventilator expiratory limb is advised. All breathing circuit filters should reach the required international standards (BS EN 23328-1) – *see explanatory picture below*.
- Separate guidelines are being developed by the Critical Care retrieval services (NAS-CCRS)
- Each unit should develop guidelines for local patient transports (to radiology etc.)

The above guidelines are not designed to be all-encompassing but to give a practical guide to clinicians in ICU tasked with the care of the critically unwell COVID-19 patient. The guidelines cannot substitute for local preparation, planning and infection prevention and control training, including hand hygiene, standard precautions and training in the appropriate use of PPE.
It is important that those aspects are considered carefully by all individual institutions.

It is also vitally important that individual ICU/HDU beds are not utilized for isolation purposes alone and that they are reserved exclusively for clinical reasons. Again, this viewpoint needs to be established on a local institutional basis.



Please note the extra bacterial/viral filters that can be placed on both the inspiratory limb (upper left) and expiratory limb (left lower) of this ventilator (Hamilton portable ventilator).
The other filter at the patient end (pink) is also a bacterial/viral filter, but differs as it also operates as a HME.