Respiratory Management of Patients with COVID-19
V1 27.03.2020

Respiratory symptoms COVID-19 +ve or suspected

For resuscitation/ ICU level care*

Suspected Type 2 respiratory failure (Hx COPD/altered mental status/other)- Take ABG
Type II: pCO2> 6 plus pH<7.35*

Monitor and repeat ABG if clinical deterioration

NO

Local Policy*

YES

Categorize patient by O2 saturations, Respiratory Rate and O2 requirement. CRS A/B/C/D (Page 2)
Target O2 saturations SaO2>94%, RR<20

In patients for intubation failing O2 therapy (hypoxia/agitation/Confusion)
Escalate Directly to CRS D (Intubate +/- ICU)

Categorize patient by O2 saturations and Respiratory Rate and O2 requirement
CRS A/B/C*(Page 2)
Target O2 saturations SaO2>94%, RR<20

NIV -BIPAP per Hospital Protocol. AGP Procedure- PPE
SEE TABLE FIGURE 2 FOR ADVICE RE MASK AND HOOD.
Close Observation-Early Intubation if appropriate*

Target O2 saturations Sa02>94%, RR<20

Isolate/Full PPE. NIV/HFNO only in –ve pressure (preferred) or single room.

Categorize patient by O2 saturations, Respiratory Rate and O2 requirement.
CRS A/B/C/D (Page 2)
Target O2 saturations SaO2>94%, RR<20

Suspected Type 2 respiratory failure

NO

YES

NIV -BIPAP per Hospital Protocol. AGP Procedure- PPE
SEE TABLE FIGURE 2 FOR ADVICE RE MASK AND HOOD.
Close Observation-Early Intubation if appropriate*

COVID RESPIRATORY SCALE (CRS) A/B/C/D**

A: Nasal cannula ≤ 3L min

B: Nasal cannula > 3 L min/ Venturi Mask 24-60%

C1: High Flow Nasal O2  C2: NIV

D: ICU +/- Intubate

*Resus status and decision for ICU level Respiratory Care (Intubation/NIV/AIRVO) will depend on patients advanced directive, frailty, co-morbidities and local hospital ICU protocol and availability.

**Discussion between Institution Lead for Respiratory Medicine, ICU lead and Clinical Engineering re Hospital Oxygen Supply
| CRS CATEGORY A | These patients can be managed in the first instance while stable on designated isolation general medical wards. However, single side rooms should in the first instance be reserved for patients requiring High flow oxygen (HFO) or NIV.  
Nasal cannula ≤ 3L
SaO₂≥94%, RR≤20 |
| CRS CATEGORY B | These patients can be managed as above BUT need an increased level of vigilance as may escalate to categories C and D QUICKLY.  
Nasal cannula > 3 L/min
SaO₂<94%, RR>20 | Non-re-breather mask (100% at 15 L/min with tight fitting mask) OPTION if no response as a bridge to Category C/D  
See WHO guidance on Clinical Management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected |

| IF FAILURE OF CRS A/B ESCALATE TO D IF FOR INTUBATION AND AGITATION/CONFUSION OR MULTIORGAN FAILURE. CONSIDER C1 OR C2 ON A CASE BY CASE BASIS |

| CRS CATEGORY C1 | These patients need to be managed INITIALLY IF APPROPRIATE on designated COVID ISOLATION WARD with RESPIRATORY MEDICINE input in close consultation with ICU colleagues. Ensure a clearly established ceiling of care and whether patient is deemed suitable for escalation to CRS CATEGORY D – intubation and ventilation.  
High flow nasal oxygen (HFNO) (AIRVO) (**AGP)**  
SaO₂<94%, RR>20: poor response to Venturi mask  
Evaluate after 1 hour. Consider escalation if failure (WHO)  
Airvo/(HFNO)-Flow rate*** 30 L/min, FiO₂ >70% via nasal cannula or mask. Titrate FiO₂ to target O₂ sat >90%  
Video link: How to set up AIRVO  
Place Surgical Mask on patient over HFNO. Use may be influenced by National Medicinal Oxygen Availability |  

| CRS CATEGORY C2 | NIV (**AGP)**  
SaO₂<94%, RR>20 poor response to Venturi mask  
High risk of failure with delayed intubation, evaluate after 1 hour.  
Consider escalation if failure (WHO)  
CPAP preferred mode† | NIV with CPAP and high flow oxygen – initial pressures of 8-10 cm H₂O and FiO₂ start 70% and titrate to O₂ sat >90% - Ventilate using HOOD if possible to minimise aerosolization. However limited availability of HOOD will necessitate use of Face mask.  
Both HOOD and mask require 2 healthcare providers to place properly (or patient to hold mask if capable). Viral filters on expiratory port  
NHS link of set up of NIV with well-fitting full facial mask and filter on exhalation port  
Video link: How to place HOOD  
Titrate if needed to pressure 10-15 cm H₂O and titrate FiO₂ to 100% - in the event you need to do this you are heading to CRS CATEGORY D – intubation and ventilation |

| CRS CATEGORY D: ICU +/- Intubate (**AGP)**  
SaO₂<94%, RR>20 but poor response to HFNO/ NIV | Inform ICU on call IMMEDIATELY-IF patient previously deemed suitable for ventilation.  
These patients need to go straight to ICU depending on ventilator availability and proposed ceiling of care. |

**Nebulizers:** Although nebulisers are not considered AGP procedure by several healthcare organizations, the use of bronchodilators through a spacer in asthma and COPD patients may have advantages including shorter duration of administration, ability to deliver through NIV Hood and patient can self-administer medicine without health care provider entering room. If nebulisation absolutely required, perform in a single room where feasible. Nebulizer can be delivered through an in-line connector if using NIV Facemask (Video link to demonstration)  
*Although NHS recommends NIV before HFNO, aerosol generation and success has not been compared and O₂ consumption varies depending on equipment and leak. Decision of which to use depends on patient factors, staff training, tolerability and equipment availability. Discussion between Institution Lead for Respiratory Medicine, ICU lead and Clinical Engineering re Hospital Oxygen Supply and Local Respiratory Devices (e.g. NIV/HFNO) oxygen usage recommended.  
**AGP Procedures:** See HPSC Guidance. There is controversy at present regarding HPSC stating HFNO is not an AGP procedure (based on data from: Leung CCH, J Hosp Infect. 2019;101(1):84-7; Hui DS, Eur Respir J. 2019;53(4); Hui DS, Chest. 2015;147(5):1336-43).  
The ITS, HSE and NCP Respiratory recommend that patients on HFNO wear a tight-fitting mask and both HFNO and chest physiotherapy be considered AGP procedures unless local policy states otherwise  
**HFNO Flow Rate:** AIRVO-Fisher & Paykel recommend no less than 30L/ min (influence of flow on aerosolization potential not studied formally).  
†CPAP preferred mode: https://emcrit.org/pulmcrit/cpap-covid/ - Not formally evaluated- COVID-19 usually causes profound hypoxemia but normal lung compliance  
Infection Control and Prevention: HSE PPE Guidance for Staff  
Further Information: Irish Thoracic Society