IRISH ASSOCIATION FOR EMERGENCY MEDICINE

EMERGENCY DEPARTMENT ESCALATION OF RESPIRATORY SUPPORT FOR PATIENTS WITH SUSPECTED OR CONFIRMED COVID-19

Version 1

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In Collaboration with the Emergency Medicine Program.

DISCLAIMER

IAEM recognises that patients, their situations, Emergency Departments and staff all vary. This guidance cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of this guidance, the use of current information and a patient's overall care resides with the treating clinician.

GLOSSARY OF TERMS

AGP Aerosol Generating Procedure

CPAP Continuous Positive Airway Pressure

CRS COVID Respiratory Scale

CXR Chest X-ray

ED Emergency Department

EM Emergency Medicine

HCW Health Care Worker

IPC Infection Prevention and Control

ITS Irish Thoracic Society

NIV Non-invasive ventilation

PPE Personal Protective Equipment

DISCLAIMER

The knowledge regarding the epidemiology, pathology and clinical management of COVID-19 is evolving. The clinical management has a limited evidence base and is mainly based on observational data, case series and consensus expert opinion. It is accepted that much of the guidance is of a pragmatic nature and may change rapidly over the coming weeks. At all times, healthcare workers are advised to consult the Health Service Executive's (https://www.hse.ie/eng/) and the Health Protection Surveillance Centre's websites (https://www.hpsc.ie/), which provide up to date guidance on the diagnosis and care of this condition.

Emergency Department Escalation of Respiratory Support for Patients with Suspected or Confirmed COVID-19

1. Strategy

a. Irish Association for Emergency Medicine acknowledges that there are multiple guidelines already in existence to determine respiratory management of COVID-19 patients. However, many of these guidelines do not address the unique logistical challenges of delivering high-quality care in EDs.

We strongly advocate that Emergency Physicians involve themselves in local interdisciplinary pathway development. Our goal is to ensure patients receive optimal care in environments safe for both patient and health care worker (HCW).

2. PPE recommendations

a. All individuals should wear PPE considered appropriate as per local and national guidance[1].

b. It is important to minimise unnecessary aerosol generating procedures (AGPs) in the ED.

c. Where AGPs are necessary, safety is a priority. Therefore, they should be performed with appropriate PPE and in an appropriate location (see section 4).

3. Clinical engineering considerations

a. Experience from the UK has shown that multiple patients using oxygen sources simultaneously may outstrip the potential oxygen delivery to the ED [2]. Specific limitations regarding the number of patients who can be safely on oxygen devices at any one time should be clarified with clinical engineering. Exceeding available oxygen supply may result in a sudden failure of oxygen supply throughout the hospital.

4. ED infrastructural considerations

a. The management of COVID-19 patients in negative pressure rooms in strict isolation represents ideal care.

b. Since negative pressure isolation rooms are rare in Irish EDs, patients should be managed in a single room isolation cubicle with a door if a negative pressure room is not available.

c. Where an appropriate isolation area is available on a ward for a COVID-19 patient who requires admission, they should be transferred there immediately from the ED.

d. As the COVID-19 pandemic progresses, any pre-existing isolation areas in the ED will likely be in continuous use. Cohorting of the entire ED into COVID-19 and non-COVID-19 areas is recommended in national and specialty guidance.

e. Many patients presenting to EDs will need AGPs and we suggest the following patient treatment locations in order of suitability:

    i. Immediate transfer to an inpatient bed in an appropriate room where the AGP therapy can be initiated. This will require an agreed pathway of admission and bed management to maintain a continuously

available bed base to which such a patient can be moved without delay.

ii. If no inpatient bed is immediately available to perform an AGP, EDs should provide a dedicated area, preferably with a door, where COVID-19 patients can be managed by ED staff with appropriate PPE worn. This could be a side room, or if this is unavailable, a cohorted area.

iii. Logistics, equipment and human factors could be adversely affected by managing patients requiring a high level of care in non-resuscitation areas. An appropriate COVID-19 area for resuscitation and high-level care should be designated within the ED.

5. Oxygenation and ventilatory support

a. Aerosolisation in COVID-19

i. COVID-19 is spread by large respiratory particles of liquid called droplets which fall on nearby surfaces and droplet precautions need to be taken.

ii. Certain medical procedures can generate smaller droplets which are light enough to travel on air. These are called aerosol generating procedures.

b. Risk of aerosolization

	Procedure	Recommended minimum PPE
Not Considered AGP [3]	O_2 via nasal cannula </= 6L	Surgical mask, glove & apron
	O_2 via non-rebreather </= 15L/ml	
	Metered dose inhaler with spacer device	
	Nebulised bronchodilators	
	Venturi mask < 60%	

Aerosol Generating Procedures [3,4,5]	High-Flow O_2 (eg AIRVO device)	FFP2 mask, eye protection, gloves & long-sleeved gown
	Non-invasive ventilation (CPAP, BiPAP)	
	Intubation	
	CPR - both chest compressions and mask ventilation	
	Sputum induction	

c. Escalation of respiratory support

i. The COVID Respiratory Scale (CRS) is shown in Table 1[6]. It may be used to guide escalation of respiratory support for patients with suspected COVID-19.

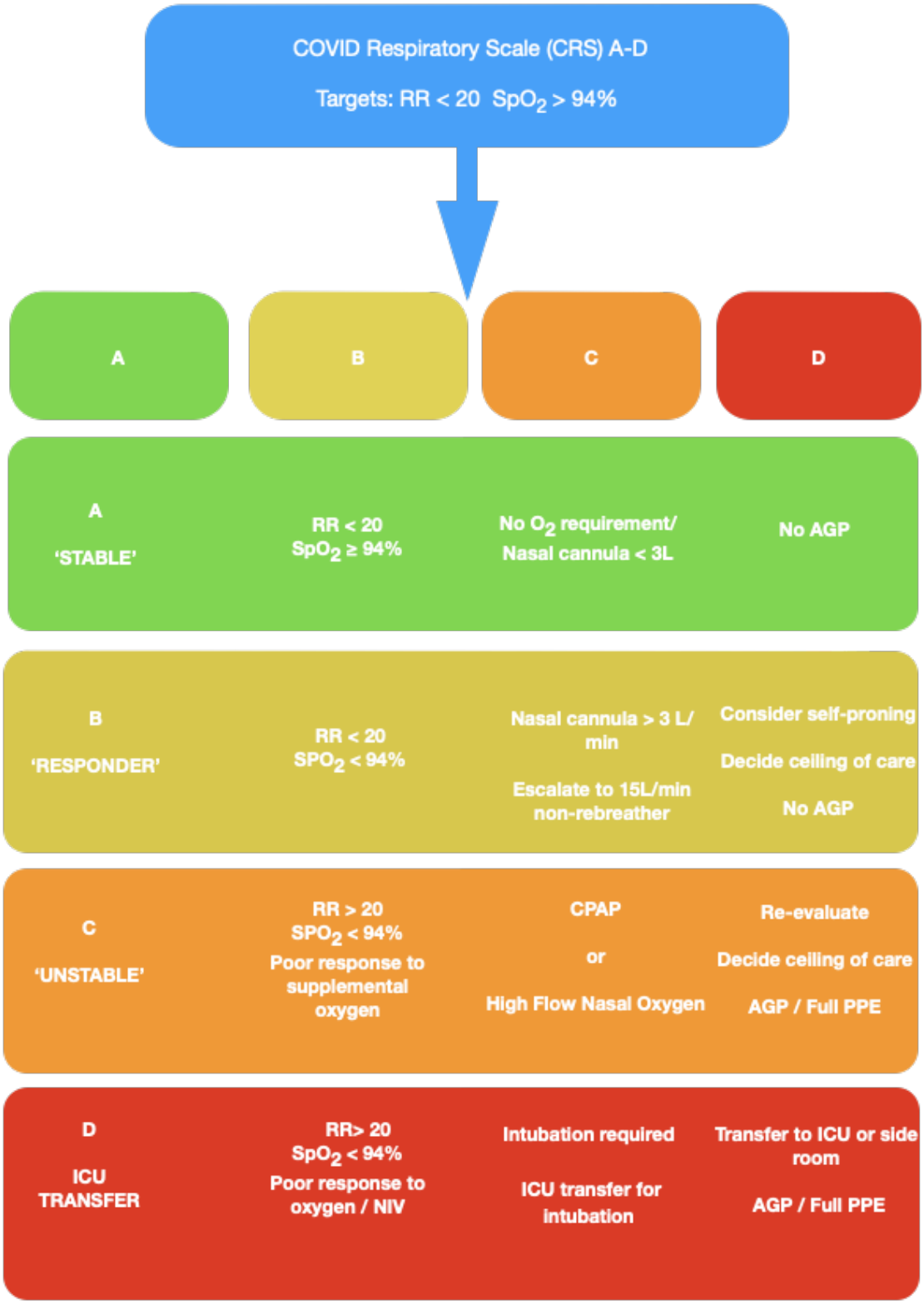
ii. A table showing the suggested escalation of respiratory support for patients with COVID-19 is shown in Table 2.

Table 1. COVID Respiratory Scale

COVID Respiratory Score	Criteria	Recommended Treatment
CRS A	SaO_2>94% RR<20	No O_2 requirement or Nasal cannula ≤3L
CRS B	SaO_2<94% RR>20 Respond well to nasal cannula	Nasal cannula >3L or venturi mask 24-60%
CRS C	SaO_2<94% RR>20 Poor response to venturi mask	HFNO* NIV*
CRS D	SaO_2<94% RR>20 Poor response to HFNO/ NIV	ICU +/- intubate*

*AGP

Table 2. Suggested escalation of respiratory support for patients with suspected COVID19



6. Indications for High Flow Nasal Oxygenation

a. Current opinion indicates that HFNO may be used as a:
    i. stand-alone treatment modality for COVID-19
    ii. ceiling of care for those not appropriate for invasive ventilation
b. Response to HFNO should be regularly assessed and intubation performed if indicated.
c. HFNO, if utilised, should be delivered in a single room or allocated COVID-19 area where ventilation is separate and staff are in appropriate PPE for exposure to AGPs.
d. A recommended flow rate of 30L/min with FiO_2 >70% via nasal cannula or mask is recommended. Titrate FiO_2 to target SaO_2 > 90%[6].
e. Higher flow rates associated with HFNO (>30L/min) may lead to dangerously increased oxygen utilisation in resource-constrained settings and increased risk of aerosolisation.

7. Indications for NIV

a. Current opinion indicates that NIV may be used as a:
    i. stand-alone treatment modality for COVID-19
    ii. ceiling of care for those not appropriate for invasive ventilation
b. Response to NIV should be reevaluated and escalation to intubation performed if indicated.
c. NIV is most commonly delivered as CPAP. A patient requiring CPAP may rapidly require invasive ventilation and warrants continuous SpO_2 and regular vital sign monitoring in a suitable area.
d. NIV should be delivered in a single room or allocated COVID-19 area where ventilation is separate, and staff are in appropriate PPE for exposure to AGPs at all times.

e. NIV may be delivered with many devices. These range from basic mask CPAP/BiPAP devices (NIPPY2 or 3, Boussignac valves) to more advanced devices (Helmet CPAP, or an invasive ventilator used in an NIV mode). Available NIV devices vary throughout Irish EDs. Each institution should use the device(s) available to them and which generate the least risk to staff through droplet aerosolisation. Correct positioning of the mask on the patient's face is vital to minimise air leaks and reduce the risk of aerosolization. Use of lower flow rates and viral/bacterial HME filters can also decrease the risk of aerosolization. EM, respiratory and intensive care medicine and clinical engineering for each hospital should collaborate to find the most suitable device for each institution.

f. The optimal NIV system for COVID-19 patients utilises a dual limb system and a non-vented facemask. The non-vented mask ensures that aerosolised droplets do not escape from the facemask into the surrounding environment. Viral/bacterial HME filter(s) should be placed between the face mask and ventilator tubing. Further filters may be needed according to the ventilators design. A suggested configuration of the *Hamilton T1* ventilator is shown in the Appendix 1.

g. More commonly available NIV devices have a single limb on the inspiratory side. If a single-limb NIV device is to be used, it is essential that there is a valve outlet, the mask used is non-vented, applied tightly with minimal or no leak, and that a HME filter is placed between the ventilator tubing and mask. A suggested configuration of the *NIPPY3* used by the respiratory department for NIV in Beaumont Hospital is shown in the Appendix 2.

h. A suggested initial pressure of 8-10 cm H_2O and FiO_2 of 70% titrating to SaO_2 >90% is recommended [6].

i. NIV should be turned off and disconnected for transfer from the ED to an inpatient area and a non-rebreather mask applied to minimise unintentional disconnection during transit.

j. An approach to the intubation of patients with suspected COVID-19 is discussed in the IAEM COVID-19 clinical guideline March 2020.

COMPANION DOCUMENTS

References

Appendix 1: Hamilton T1 Ventilator set up for NIV for suspected or confirmed COVID-19 patients

Appendix 2: NIPPY3+ set up for suspected or confirmed COVID-19 patients, reproduced with permission. Original author Dr Emmet O Brien, Beaumont Hospital Respiratory Department.