

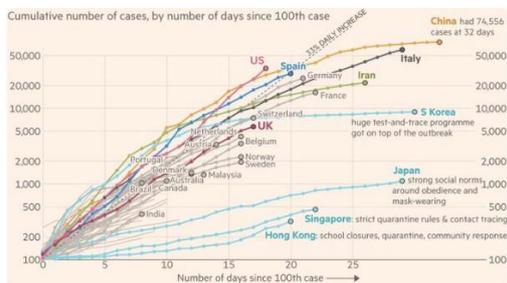
Clinical update no. 556

25 March 2020

While hardly pretending to add to the detailed information circulated daily, the attached may provide some useful information and links to expert opinion, including new Surviving Sepsis Campaign Guidelines, WHO, MJA Consensus Guidelines and some algorithms from Brigham and Women's in Boston (they're just what was available, not necessarily better than others).

It's an evolving field with a new disease and recommendations will evolve. As with every disease, blanket recommendations cannot apply to all cases, and provided reducing spread and staff safety is held paramount then they can adapted to an individual patient

There is substantial concern about viral spread with oxygenation and airway management, and the varying conclusions and interpretation of available data is worth knowing. However it won't change the absolute requirement to follow local protocols for management.



Quarantine works (sensible neighbours also help, but Singapore won't let anyone else in).

The Medical Journal of Australia – Preprint only

Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group

<https://www.mja.com.au/system/files/2020-03/Updated%20PREPRINT%20SAS%20COVID19%20consensus%20statement%2017%20March%202020.pdf>

2002 SARS-CoV in Canada

half of all cases were nosocomial transmission to healthcare workers

Aerosol generating procedures include NIV, +ve pressure bag valve mask, HFNO, nebs, suction. Intubation itself requires an additional event generating gas flow, eg coughing, PPV.

Non-invasive ventilation (NIV)

Limited data

Influenza A (H1N1)

NIV failed in 57-85%

Failing patients

Higher ICU mortality than with mechanical ventilation

COVID-19

Wuhan data showed similar failure rate

29 on NIV, 22 subsequently intubated

Mortality approx. 80% in both NIV and intubation

HFNO

Utility in viral pandemics is unknown

Risk of virus aerosolisation

Difficult to quantify

NIV and HFNO

Airborne isolation rooms

Full PPE (including N95/P2 masks)

Should not be used for

Severe respiratory failure

Trajectory where invasive ventilation is inevitable

Intubation and invasive ventilation without delay

The SAS Guidelines

Airway Management

Pre-oxygenation

Avoid high flow oxygen (nasal, facemask, non-rebreather) when the team is in position

Turn off O2 prior to removing nasal cannula/mask

Apply well fitted, occlusive facemask device with a viral filter

Avoid high flow nasal oxygen for apnoeic oxygenation



Rapid sequence intubation (RSI)

Rocuronium (>1.5mg/kg IBW) OR suxamethonium (1.5mg/kg)

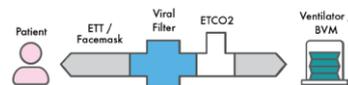
Routine use of a video laryngoscope is recommended for the first attempt

First pass success

Reduce the risk of viral transmission

Suxamethonium has a short action with a risk of coughing and viral spread if it wears off.

Circuit Setup



Collaboration between Safe Airway Society + RNS ASCAR

v1.0 March 2020



BRIGHAM AND WOMEN'S HOSPITAL

Brigham and Women's Hospital COVID-19 Critical Care Clinical Guidelines

Updated: 3/23/2020

https://www.covidprotocols.org/?fbclid=IwAR0kcpHWQxW3_gLHN0kQvR9kYBUNNKDitgqiUj8wjMbIMu7Kl31VCOA3CZk

A useful summary.

QUICK GUIDE FOR MANAGEMENT OF CRITICALLY ILL PATIENTS WITH COVID-19: RESPIRATORY FAILURE

OXYGEN THERAPY: **Goal SpO2 92-96% PaO2 >75**

- Nasal cannula 1-6L/min → if need more O2 use venturi mask
- Consult anaesthesia EARLY (when Venturi mask @ 60%)
- AVOID CPAP or BiPAP for ARDS, but can consider in reversible cases (e.g. flash pulmonary edema, mild COPD exacerbation)

RESPIRATORY FAILURE ALGORITHM: What to do in each situation...

NC 1-5L/min to maintain SpO2 goal
*GOC and code status discussion

@ NC 6L/min to maintain SpO2 goal
*Consult anaesthesiology → contingency plan re intubation
*Consult RT → consider venturi mask or non-rebreather
*Consult COVID ICU triage → for ICU transfer when needed

Venturi Titration: if decide to attempt this after discussion w anaesthesiology, first FIO2 to 0.35, then flow to 12 L/min

*If respiratory deterioration or rapid increase in FIO2
→ CALL ANESTHESIOLOGY TO INTUBATE

Early Intubation (per anaesthesiology intubation guidelines)
*Use lung protective ventilation → see below for details
*If persistent hypoxemia → use right side panel for approach
*Determine ICU care with COVID ICU triage + MICU attending

UPFRONT VENTILATOR SETTINGS: Immediately upon intubation
Volume control with Vt 6cc/kg IBW + RR 16-24 + FIO2 1.0 + PEEP based on BMI as below
- If BMI < 35 PEEP 10; if BMI 35-50 PEEP 12; if BMI > 50 PEEP 15

Version 1.0 2020
*This quick guide is for use as a decision support tool, please read the full guideline on the QR code below.
For urgent questions please contact the BMH ICU triage pager (435999)

INITIAL VENT ADJUSTMENTS: (do this before bedside procedures)

	FIO2	PEEP
1) TITRATE PEEP with RT help if Hamilton G5 vent	0.21	5
Use PV tool, otherwise Best PEEP protocol (if RT has time) or ARDSNET lower PEEP table w/ RT help see here →	0.21	5
2) TITRATE DOWN FIO2 for goal SpO2 92-96% or FIO2 < 0.75	0.21	5
3) MEASURE RESISTANCE + COMPLIANCE (RT can do this)	0.21	5
4) MEASURE PLATEAU PRESSURE: if >30, decrease Vt to 4cc/kg IBW (tolerate incr pCO2 as a result)	0.21	5

WHAT TO DO FOR DIFFICULTY WITH OXYGENATION

- 1) PEEP titration (see above for initial settings)
- 2) Increase sedation to goal RASS -5
- 3) Initiate continuous paralysis
- 4) PRONE POSITIONING if P/F < 150 or FIO2 > 0.75
See MICU protocol for proning
1) for goal-prone check mechanics + adjust PEEP as above
2) proning if P/F > 200 or if O2 @ goal w FIO2 < 0.5
- 5) Inhaled epinephrine (levent) titrate to 0.10mg/kg/min by continuous neb, 4-8 hrs if P/F no better w/ all per protocol
- 6) Inhaled Nitric Oxide: 40-80ppm into vent circuit trial 4-8 hrs if P/F no better w/ all over 2 hrs
- 7) ECMO consultation

VENT TITRATION for ACID/BASE ISSUES: target pH 7.25-7.45

- if pH < 7.25 increase RR towards 35
- if pH < 7.15 and RR is 35 then increase Vt to 8cc/kg IBW (as long as plateau pressure < 30) AND do steps 1-4 above (sedation to RASS -5 + paralysis + prone)

OXYGEN THERAPY: **Goal SpO2 92-96% PaO2 >75**

- Nasal cannula 1-6L/min → if need more O2 use venturi mask
- Consult anaesthesia EARLY (when Venturi mask @ 60%)
- AVOID CPAP or BiPAP for ARDS, but can consider in reversible cases (e.g. flash pulmonary edema, mild COPD exacerbation)

Avoid humidification of gases to reduce aerosolisation and risk of spread.

There is some discussion (*but not enough to ignore recommendations on management*):

[WHO interim guidance \(published March 13, 2020\)](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected) on COVID-19 are more liberal about the usage of HFNC and NIPPV, stating that systems with "good interface fitting [i.e., good seal, no air leak] do not create widespread dispersion of exhaled air and therefore should be associated with low risk of airborne transmission."

Early intubation is recommended because of the high failure rates with non-invasive ventilation, including high-flow nasal oxygen. Do RSI using video laryngoscopy when fully paralysed without an ambubag (which generates aerosols).

UPFRONT VENTILATOR SETTINGS: Immediately upon intubation

- Volume control with Vt 6cc/kg IBW + RR 16-24 + FIO2 1.0 + PEEP based on BMI as below
- If BMI < 35 PEEP 10; if BMI 35-50 PEEP 12; if BMI > 50 PEEP 15

VENT TITRATION for ACID/BASE ISSUES: target pH 7.25-7.45

- if pH < 7.25 increase RR towards 35
- if pH < 7.15 and RR is 35 then increase Vt to 8cc/kg IBW (as long as plateau pressure < 30) AND do steps 1-4 above (sedation to RASS -5 + paralysis + prone)

Use ARDSNET protective strategies.

STEROIDS: not recommended in the covid patient

- Avoid empiric steroids unless other indication for steroids:

Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19)

https://sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf?lang=en-US&_z=WSjd1&_z1=1cc6

Experience with SARS was that intubation carries a risk of disease transmission to staff, and that HFNC did not result in increased disease transmission. HFNC resulted in environmental contamination similar to conventional O2 therapy.

The balance between benefit and harm when using NIPPV in adults with COVID-19 is unclear.

However Guidelines are clear – do not use HFNO or NIV; just be aware of the discussion.

[https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected) WHO site

Cardiac Complications of COVID-19

Cardiogenic shock from viral myocarditis is a feature of COVID. Intensivists suggest avoiding propofol infusions for sedation due to concern in aggravating this risk.

Old fashioned morphine/midazolam is recommended. Fentanyl is an option but there are logistic issues with large dosing required.

Noradrenaline, diuresis and dobutamine (if MAP > 65 mm Hg) are recommended for cardiogenic shock.

SHOCK: in covid patient think about distributive vs. cardiogenic

- **DISTRIBUTIVE SHOCK:** (bacterial superinfection, ventilator associated PNA, catheter associated infection urinary /CVC)
 - o **WORK UP** → CBC w/ diff + procal + Blood cx + UA + tracheal aspirate gram stain and culture (if possible)
- **CARDIOGENIC SHOCK:** (myocarditis-like syndrome with left sided heart failure, ACS, stress or septic cardiomyopathy)
 - o **WORK UP** → ECG + troponin + NT-proBNP + LFTs + central venous O2 sat (CVO2)

MANAGEMENT OF CARDIOGENIC SHOCK (CS) w/ no PA line
****ALWAYS CONSULT CARDIOLOGY****

High probability CS if elevated NT-ProBNP, CVO2 < 60%, +/- bedside ultrasound w LV function down (additionally: formal TTE if possible)

- **Start NOREPINEPHRINE drip upfront titrate to MAP 65-75**
- Diuretic therapy if CVP > 14, titrate to goal CVP 6-14 + monitor urine output (response to therapy)
- Inotropic support with dobutamine drip if MAP > 65, start at 2mcg/kg/min up-titrate by 1-2 mcg/kg/min every 30-60min for goal CVO2 > 60. Consider alternate strategy at 5, max dose 10 mcg/kg/min. (Beware of side effect: tachyarrhythmias)
- Check daily LFTs (for hepatic congestion)
- Serial lactate and CVO2 both q4-6hrs
- Mechanical circulatory support → consider if CVO2 < 60% and/or Lactate > 4 at dobutamine 5 mcg/kg/min

Note the issues with Hydroxychloroquine/Azithromycin (not enough evidence to use), ACEI/ARBs (not enough evidence to stop), and NSAIDs (not enough evidence to avoid).

These updates are a review of current literature at the time of writing. They do not replace local treatment protocols and policy. Treating doctors are individually responsible for following standard of care.