



Saint John Regional Hospital

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NiPPV in COVID-19 – A Review of the Literature

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Brewster DJ, Chrimes NC, Do TBT, et al.

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

Med J Aust 2020

Risks:

- Droplet and aerosol spread
- Laryngoscopy, if coughing or suctioning
- FONA – if receiving pos pressure vent from above
- High gas flow – avoid HFNO, Nebs, open system suction

NIV:

- H1N1 – failed in 57-85% resulting in increased ICU mortality
Wuhan had similar failure rates
Potential risk is delay to intubation

HFNO:

- Usually reduces ICU care but use in pandemic unknown
- For Infl A – 45% avoided intubation but may have had milder disease, all other moderate case resulted in intubation
- Issue is benefit vs aerosol risk

Until safe data available consider NIV & HFNO as aerosol generating

Pre- Ox:

- Well fitting, occlusive mask
- No to NRM and nasal cannula

Hui DS, Chan MT, Chow B.

Aerosol dispersion during various respiratory therapies: a risk assessment model of nosocomial infection to health care workers.

Hong Kong Med J. 2014;20 Suppl 4:9–13.

Simulator experiment, looking at distance and direction of particle spread, and effect of double door neg pressure room.

70kg sim, 45deg in bed, airflow model by intrapulm smoke, HD image capture, 20 breaths per modality

Results:

MASK	DISTANCE
NiPPV masks (x3 types) (10 to 18 cmH ₂ O of PEEP)	40 - >95cm
Simple O ₂ mask (10L/min)	40cm ; >40cm when coughing
Jet Neb	45-80cm
Nasal cannula	42cm max
Venturi mask	29 – 40 cm
NRM	<10cm

Neg Press effective if 12 air changes /hr

NRM – low dispersion distance

Hui DS, Chow BK, Lo T, et al.

Exhaled air dispersion during high-flow nasal cannula therapy versus CPAP via different masks.

Eur Respir J. 2019;53(4):1802339. Published 2019 Apr 11.

ABSTRACT ONLY

Simulator study, exhaled smoke model with detection by laser light sheet.

CPAP 5-20 cmH₂O

HFNC 10-60 L/min

Normal Lung	18-26 cm
CPAP	20-30cm (when PEEP increased 5 to 20)
HFNC	6-17cm (when increased 10-60 L/min)

Air leakage 62cm laterally when tubing loose.

Leung CCH, Joynt GM, Gomersall CD, et al.

Comparison of high-flow nasal cannula versus oxygen face mask for environmental bacterial contamination in critically ill pneumonia patients: a randomized controlled crossover trial.

J Hosp Infect. 2019;101(1):84–87.

Randomized controlled crossover trial

Bacterial airborne and contact surface contamination in pts with Gm neg bact pneumonia

Primary outcome GNB count

Single rooms, pts on optiflow (60L/min) or mask, sats >92%.

Air samples at 3 locations around room

Passive contamination by settling on plates

196 possible patients ; only 19 participated

No difference in GNB counts in either intervention at 0.4m and 1.5m

1 organism found in 28%

Limitations

- States reduced risk of droplets, but doesn't look at aerosols
- Only looked at bacterial spread, not at viruses
- Funded study (Fisher & Paykel – makers of optiflow)

Ñamendys-Silva SA.

Respiratory support for patients with COVID-19 infection [published online ahead of print, 2020 Mar 5].

Lancet Respir Med. 2020;S2213-2600(20)30110-7.

Correspondence

Wuhan:

- 52/710 went to ICU
- 29/52 NIV
- 22 of those 29 went on to intubation
- Mortality was for NIV then to ICU was 23/29 (79%)
- Viral pneumonia – NIV does not change course of disease

Clinical management of severe acute respiratory infection when novel coronavirus (2019-nCoV) infection is suspected

Interim guidance

28 January 2020

Para 5 – classed as yellow – consider

HFNO or NIV

- Use in selected hypoxic patients
- Risk of failure is high and they require close observation
- Risk of delayed intubation
- High failure rate in MERS for NIV

Kotoda M, Hishiyama S, Mitsui K, et al. Assessment of the potential for pathogen dispersal during high-flow nasal therapy

[published online ahead of print, 2019 Nov 20].

J Hosp Infect. 2019;S0195-6701(19)30479-7.

HFNC – rate 60L/min = 30km/hr

Issue is mouth opening, speaking – frequent; droplet spread increases with increased mucus

Aim: looked at pathogen dispersal during HFNC use

Method:

Optiflow; airway manikin, water sensitive paper, fresh yeast

Minimal detection size 50mcm (avg droplet size 50-100)

Turned on for 10mins at 60L/min

Paper collected 1 hr later

Repeated x3 for each; reg treatment, standby mode, moving nasal cannula

Fresh yeast in oral and nasal cavities – for petri dish inoculation

Results:

Water detected on one sheet in front of face

Manual repositioning of cannula increased dispersion (3 sheets), nothing 5m away

Yeast – dish closest to manikin; repositioning 2 dishes

Discussion – nothing 60cm away

Conclusion: HFNC does not increase risk of spread – does not eliminate fomite spread

Limitations:

- May cause aerosolization – this was not looked at
- Manikin was supine – most pts would be sat up, changing direction of spread
- Not able to simulate coughing or talking
- Did one piece of the paper obstruct the others from getting wet?

EMCrit Wee – Stop Kneejerk Intubation with the EMCrit Crew

March 30, 2020 by Scott Weingart

- Advantage of awake pts who are on CPAP or highflow, they can self recruit alveoli while moving around.
- The reason is that these pts are hard to get them off the vent
- Does paralysis cause derecruitment of alveoli
- Do we let them ride through the waxing and waning episodes and not intubate them.
- Seems we can get more people through on CPAP
- Is there some selection bias? These are the patients that you wouldn't intubate normally. However we do need to accept the numbers (vital signs) may be bad, but if they look ok then they will recover by this mode.
- Does not address the risk of spread – unless we get helmet CPAP and lots of neg pressure rooms

COVID-19: A Powerful Message from Italy – Rebel EM

Written by Salim Rezaie

MARCH 20, 2020

- We used helmet CPAP on all patients with a pO₂ <60 mmHg or a respiratory rate >30/min on 15 L/min non-rebreather masks, then shifted to non-invasive ventilation in patients with persistent respiratory distress and finally intubated patients non-responsive to non-invasive ventilation.
- Based on our data, from 02/29 to 03/10, 31% of the patients being admitted needed some form of ventilatory support (helmet CPAP 81%, NIV 7%, IMV 12%).

COVID-19 Hypoxemia: A Better and Still Safe Way – Rebel EM

Written by Salim Rezaie

MARCH 31, 2020

- Use of HFNC/NIV are unlikely to represent a disproportionate risk of droplet exposure as compared to other forms of ventilatory support
- Use of HFNC at a flow rate of 40LPM with a surgical facemask in place over the patients mouth and nose is no different and shows no greater dispersal of particles than low flow oxygen with a facemask in place
- Awake proning is feasible and may stave off early intubation
- A better and still safe way to manage COVID-19 patients with ARDS:
- NC 6LPM + Surgical Mask (Goal SpO₂ 88 – 92%) if this fails...
- HFNC + Surgical Mask + Awake Prone → Calculate ROX Score (Pulse Ox/FiO₂/RR) at 2hr, 6hr, and 12hrs → if <4.88 → Consider Intubation
- Another option would be CPAP + Awake prone position instead of HFNC before considering intubation

GREAT OPTION IF WE CAN COHORT PATIENTS AND USE FULL PPE AND THEN RISK OF AEROSOL IS SMALL, AND DOESN'T MATTER .

Critical care preparation and management in the COVID-19 pandemic

Royal College of Anaesthetists (UK)

17 March 2020

High Flow oxygen delivery devices

- High Flow Nasal Oxygen or similar devices should be avoided. There is no survival benefit compared to conventional oxygen therapy, and the risk of environmental viral contamination may be higher.

Non-invasive Ventilation devices

- Use of CPAP or NIV should be confined to short periods using a well-fitting interface (full face mask or helmet) as a bridge to invasive mechanical ventilation.
- For some patients, NIV will form the appropriate ceiling of care. In these cases, due to the risk of environmental viral contamination, it is preferable to deliver NIV in an isolated environment (negative or neutral pressure room).
- Use of NIV following extubation in the recovering patient should be informed by repeat testing of COVID-19 status.
- If possible, an antimicrobial filter should be located on the expiratory limb of any NIV device.

Covid-19 Podcast from Italy with Roberto Cosentini. St Emlyn's

Simon Carley

March 14, 2020

- Although hypoxic, patients have good lung compliance
- Most patients are hypoxic and this responds to O2 and CPAP. You're going to need a lot of CPAP and how that happens could be tricky. They found hoods the best

One of the most useful things I found (from multiple sources) is good PPE saves the team. This was learning from the Lombardy experience.