COVID – 19 in ICU

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theAlfred

NATIONAL COVID-19 CLINICAL EVIDENCE TASKFORCE

2020…….So now very different

23 Patients Currently

No Staff Infections

Is COVID -19 a severe disease?

Prone Positioning Bedside Guide

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Criteria & Contraindications

Criteria for Prone Ventilation

Ventilated for < 36 hours
And
Severe ARDS (P:F <150)
And / Or
Pathology likely to respond to proning

Absolute Contraindications

- Severe cardiac instability
- Raised intracranial pressure
- Recent sternotomy, tracheal, facial or eye trauma/ surgery
- Unstable fractures of spine, femur or pelvis
- Terminal respiratory failure
- Massive haemoptysis
- > 7 days of ventilation (consider prone ventilation of > 36 hours but < 7 days)

Relative Contraindications

- P/F Ratio 150 - 200
- Pregnancy
- Morbidly obese (BMI > 40) or gross ascites
- Recent abdominal surgery (Discuss with Surgical Team)
- Lung Tx < 1month ago (Discuss with Tx Team)
- Bronchopleural fistula or mild haemoptysis
- New tracheostomy (<24 hours)
- Extensive DVT
- Presence of permanent pacemaker or AICD

Pre Proning Manoeuvre Planning

Prepare Patient (Bedside Nurse)

- Check ETT depth
- Replace Anchorfast with tapes
- Check cuff pressure

- Check in-line suction, external suction & capnography working
- Suction nose, mouth & airway
- Pre-oxygenate at 100%

- Review haemodynamic trends
- Address any instability

- Ensure patient sedated (RASS –2 to -4) +/- paralysed

- Dress any anterior wounds or pressure areas
- Eye care - Long acting eye ointment + occlusive dressing
- Perform front wash (if time)

- Stop feeds & NGT onto free drainage (1hr prior)

Prepare Equipment (Proning Team)

Equipment:
❑Intubation trolley
❑ICU air mattress bed
❑Spare ECG dots

Proning Box
❑Fresh sheets x 2
❑Slide sheets x 2
❑Flat pillows x 5
❑Foam face pillow

Circuit / Line Safety:
❑Ensure all *ventilator connections secure*
❑Secure all tubes, catheters & lines
❑Disconnect non-essential lines
❑Ensure adequate length to allow turn
❑Gather catheters to head / foot of bed
❑Remove ECG dots *immediately prior to proning*

Monitoring & Environment:
❑Confirm all monitoring attached & working
❑Check air mattress set to Firm / CLP
❑Ensure bed area free of obstructions
❑Place slide sheet under patient sheet

Ensure appropriate PPE available at bedside

Prepare Team

Circuit / Line Safety
Airway
Ventilator
Proning Staff 1
Proning Staff 3
Proning Staff 2
Proning Staff 4
Team Leader

Proning Manoeuvre

Planning & Preparation → Horizontal Move → Side lying position → Complete Proning → Post Checklist

Immediate Post Prone Checks

❑Confirm ETT position
❑Confirm ETT patent by passing in -line suction
❑Ensure ETT pilot tube free
❑Check ventilator circuit for kinks

❑Check SpO_2
❑Auscultate for breath sounds
❑Ensure lung protective ventilation
❑ABG 30 minutes post proning

❑Reapply ECG dots
❑Reassess haemodynamics

❑Check NGT position at nose
❑Recommence feeds when able

❑Reposition patient to the centre of the bed
❑Return air mattress to previous settings
❑Remove slide sheets
❑Maintain bed flat—do not tilt

❑Position head:
- ❑ Allow access to the airway
- ❑ No pressure on eyes

❑Neck should be flexed slightly forward, chin tucked in
❑Position arms in swimmer position
❑Check abdomen is hanging free
❑Spine in neutral position

A Patient:

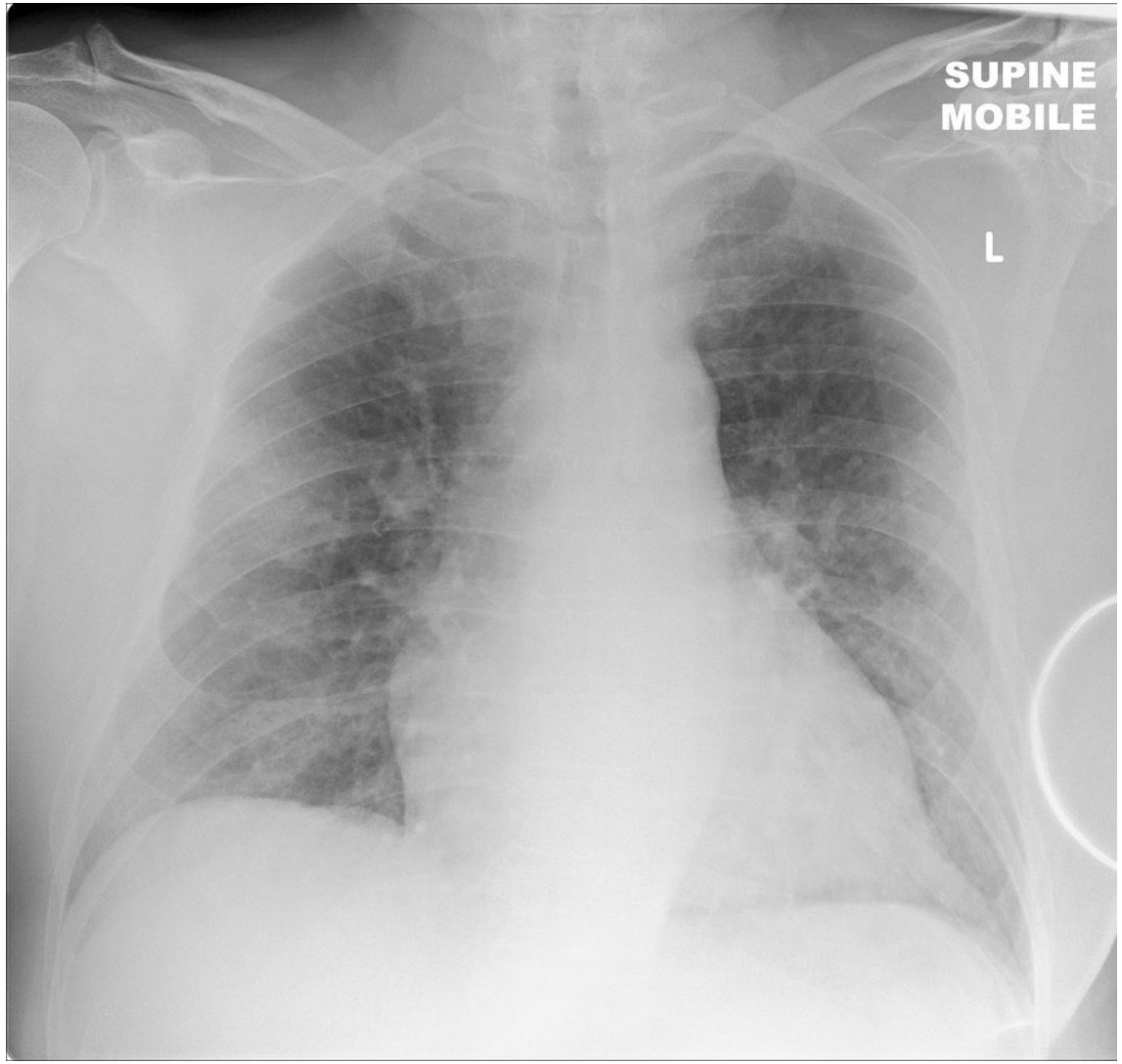
55 year old male

- Overweight
- Hypertension
- Symptoms for 7 days

Presents SOB in Emergency

- RR 36
- Sats 88%
- Febrile

What would you do?



Started on HFNP

Deteriorating on the ward

Brought to ICU

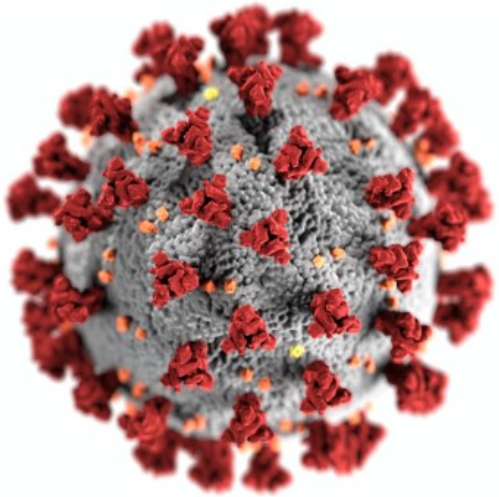
Should we try CPAP

Should we intubate

Should we consider ECMO

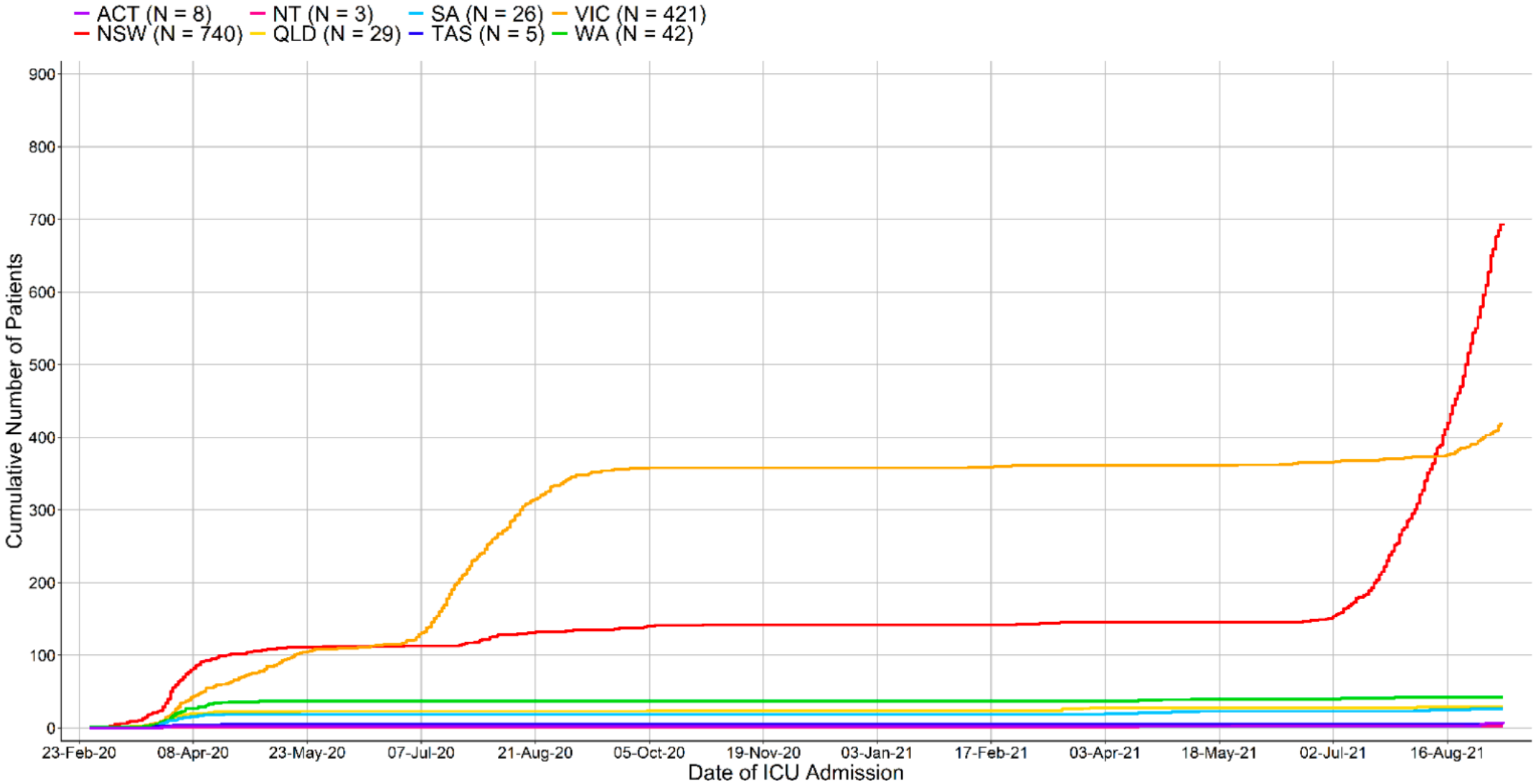
1. Outcomes in ICU?

2. When and how to use mechanical ventilation?

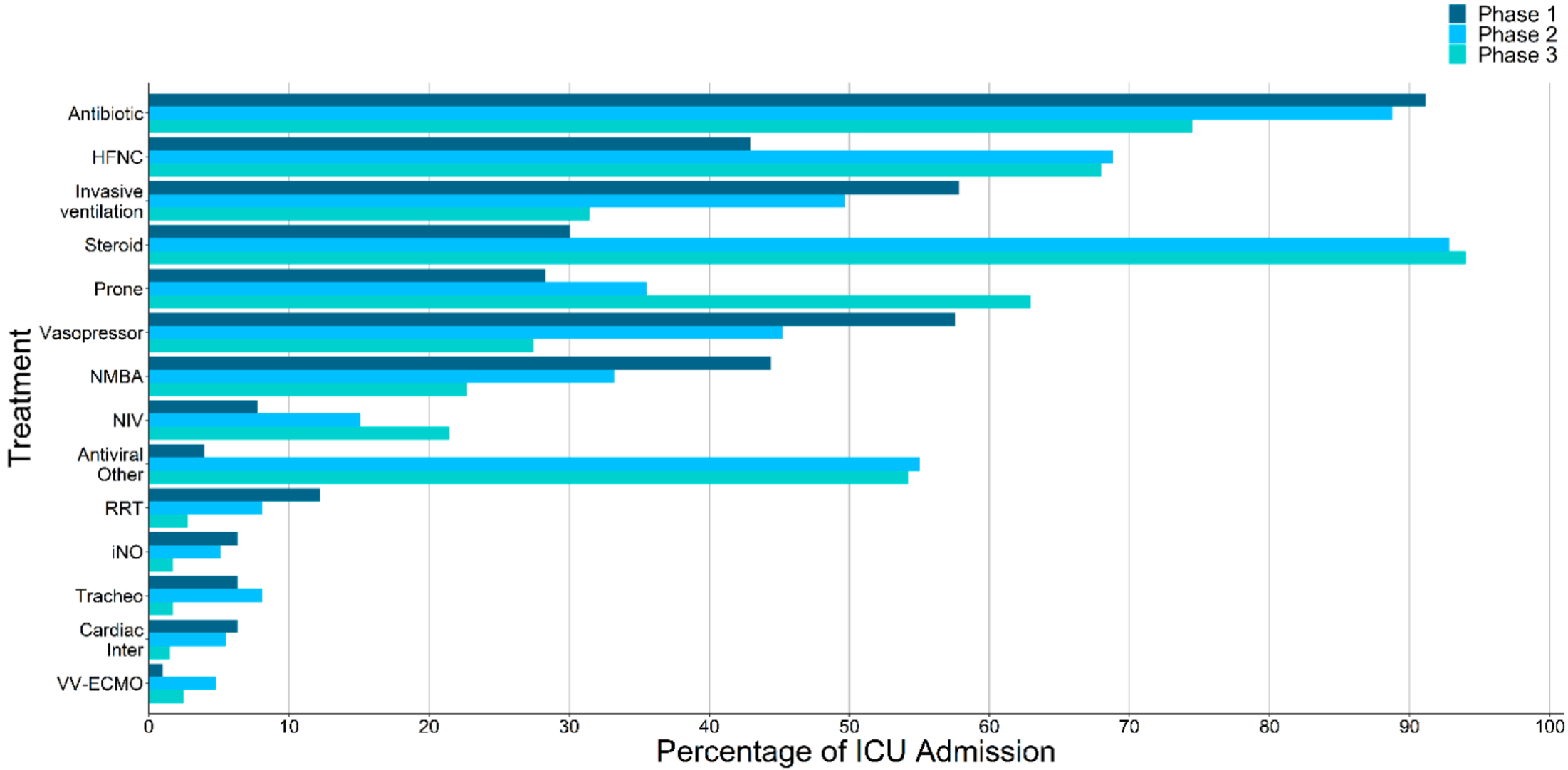


If parenting was easy there would not be a 1000 books written about it!

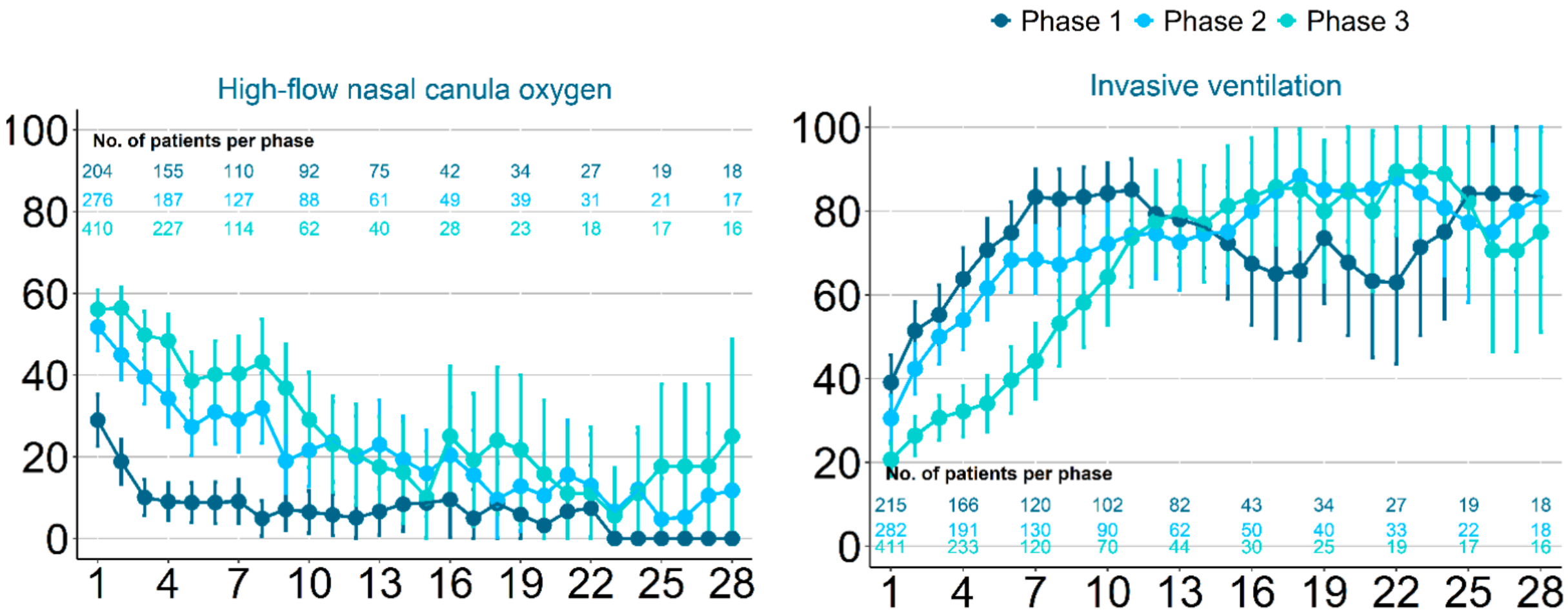
Cumulative number of ICU admissions with confirmed or strong clinical suspicion of COVID-19 by State and Territory



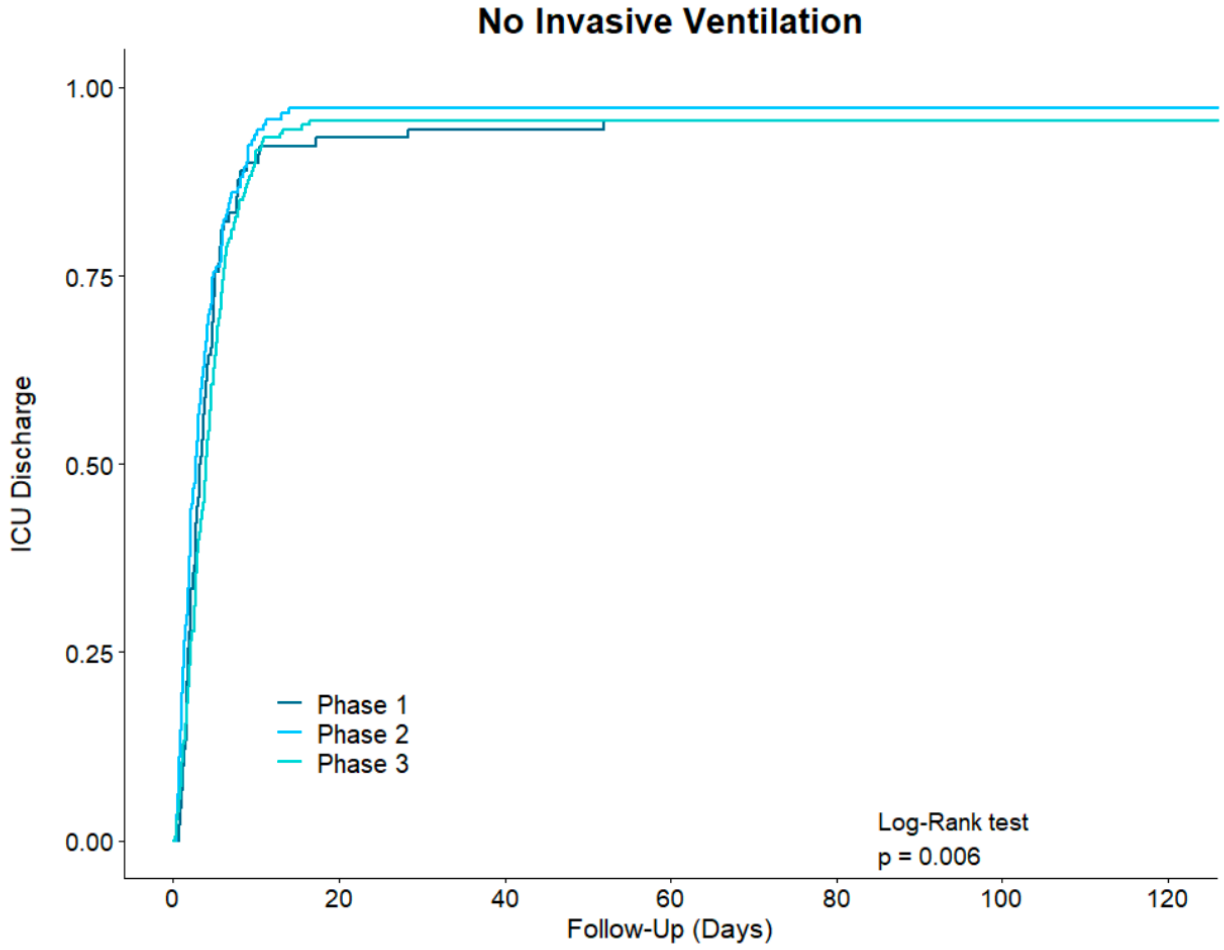
Treatment reported at any time during ICU admission according to the phase – Confirmed COVID19



Daily treatment while in ICU according to the phase – Confirmed COVID-19

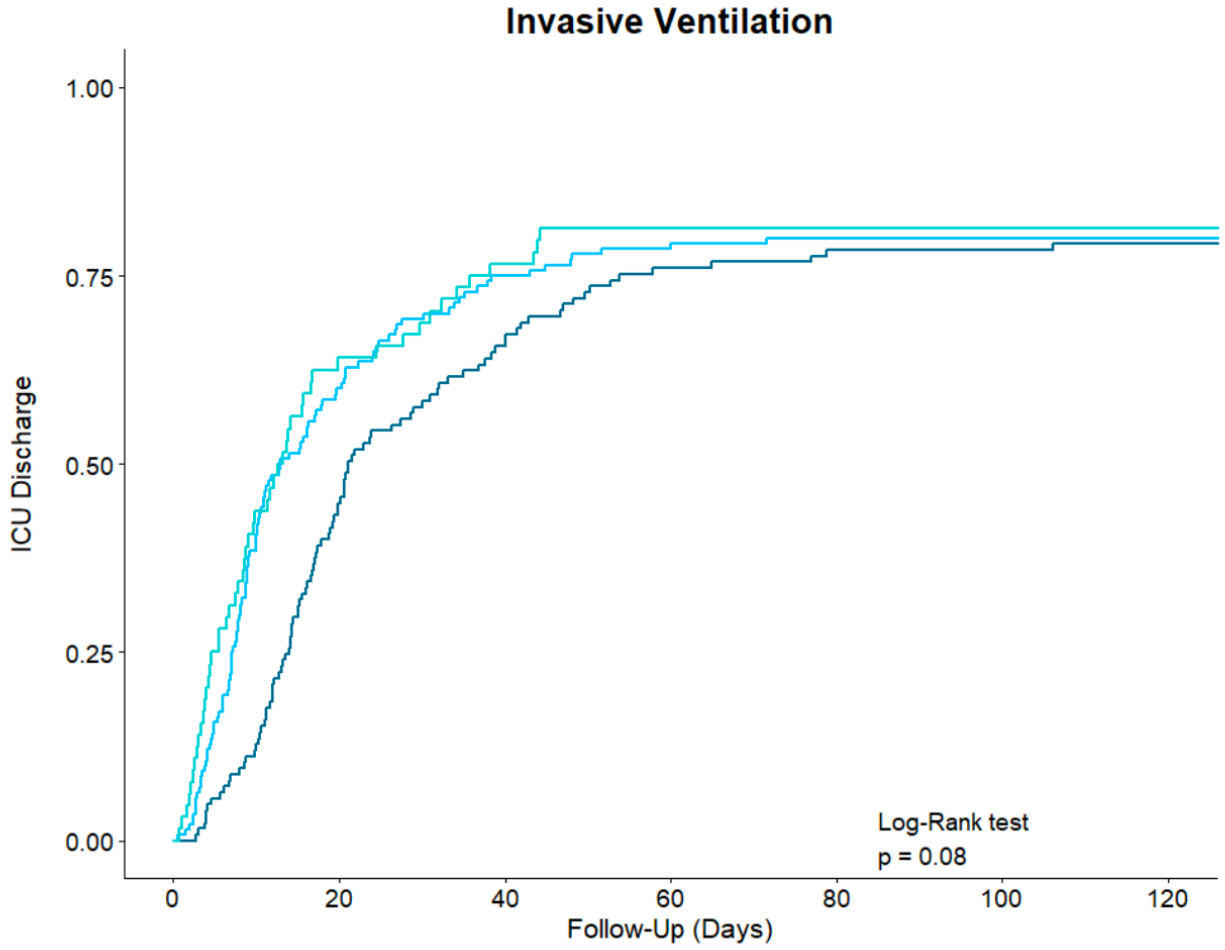


Kaplan-Meier Curves of ICU Discharge



No. at Risk

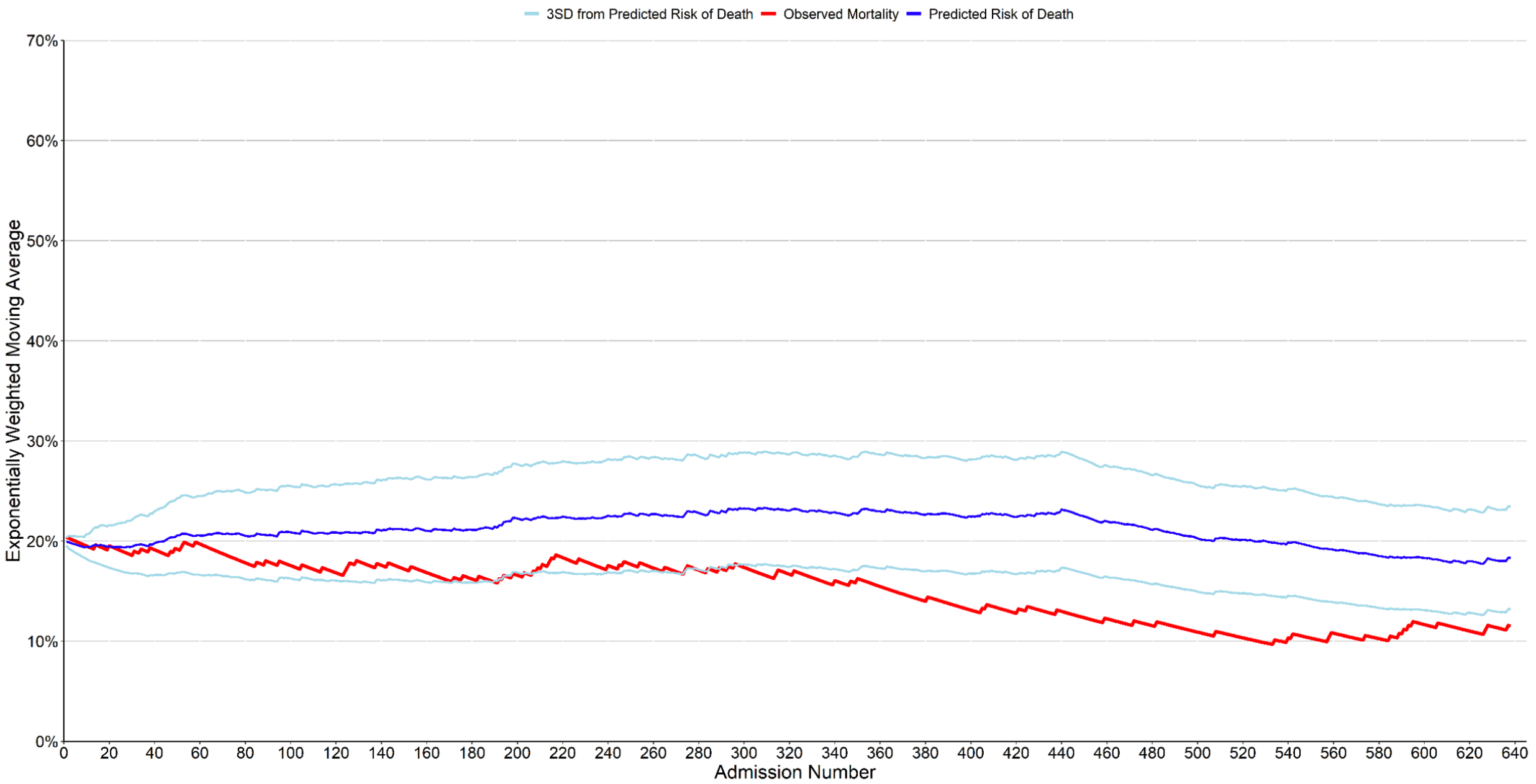
Phase 1	90	6	5	4	4	4	4
Phase 2	143	4	4	4	4	4	4
Phase 3	180	8	8	8	8	8	8

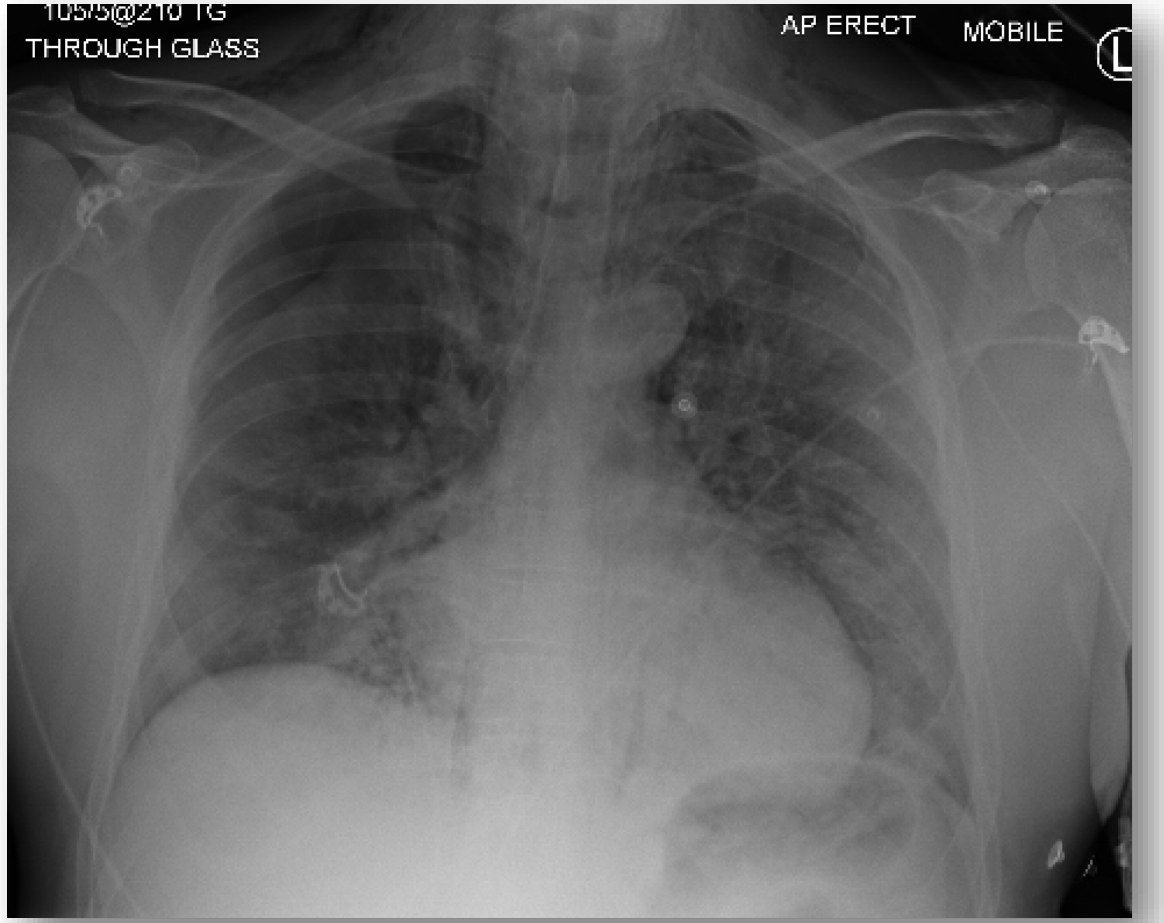


No. at Risk

Phase 1	125	69	43	30	27	27	26
Phase 2	140	56	35	30	28	28	28
Phase 3	64	23	15	12	12	12	12

. APACHE II Risk of Death EWMA Chart – Confirmed COVID-19




AP ERECT
MOBILE
THROUGH GLASS

Conditional recommendation

Consider using HFNO therapy for patients with hypoxaemia associated with COVID-19, ensuring it is used with caution and strict attention is paid to staff safety including the use of appropriate personal protective equipment (PPE). If HFNO is being used, ideally this should be in a negative pressure room. If none is available, other alternatives are single rooms, or shared ward spaces with cohorting of confirmed COVID-19 patients only.

Outcome Timeframe	**Study results and measurements**	**Absolute effect estimates** Conventional therapy	 HFNO	**Certainty of the Evidence** (Quality of evidence)	**Plain language summary**
Mortality 9 Critical	Relative risk 0.94 (CI 95% 0.67 — 1.31) Based on data from 1407 patients in 4 studies Follow up: 7 to 90 days.	**272** per 1000	**256** per 1000 Difference: **16 fewer per 1000** (CI 95% 90 fewer — 84 more)	**Low** Due to serious imprecision and indirectness	HFNO may have little or no difference on mortality. No imp. diff.
Invasive ventilation 9 Critical	Relative risk 0.85 (CI 95% 0.74 — 0.99) Based on data from 1687 patients in 8 studies Follow up: 2 to 28 days.	**286** per 1000	**243** per 1000 Difference: **43 fewer per 1000** (CI 95% 74 fewer — 3 fewer)	**Very low** Due to serious risk of bias, imprecision and indirectness	We are uncertain whether HFNO increases or decreases invasive ventilation. Uncertainty

An adaptive randomized controlled trial of non-invasive respiratory strategies in acute respiratory failure patients with COVID-19

Perkins @perkins_gd medRxiv Pre-print 2021 doi: https://doi.org/10.1101/2021.08.02.21261379

Clinical Question

- In hospitalised patients with COVID-19 requiring >40% FiO2 to achieve SaO2>94%, does the use of continuous positive airway pressure (CPAP) or high flow nasal oxygen (HFNO) compared with conventional O2 therapy (COT) reduce the incidence of tracheal intubation or death within 30 days?

"In adjusted logistic regression analyses, the study found that people randomised to receive CPAP were about 33% less likely to experience the "composite" (combined) outcome of intubation or death within 30 days than those randomised to receive conventional oxygen therapy. Sub-analysis showed that it was predominantly a reduction in intubation rates (by 34%) that was driving this finding rather than a reduction in mortality.

	CPAP	COT	HFNO
Device Intolerance	5.8%	0.2%	0.7%
Haemodynamic instability	11.3%	6.1%	8.6%
Pneumothorax	1.8%	2.3%	1.9%
Pneumomediastinum	3.2%	1.1%	0.1%

Is COVID pneumonia 'normal' ARDS

Study	PEEP [IQR]	Tidal Volume ml/kg	Driving pressure cmH2O	Compliance [IQR] ml/cmH_2O	Proning
Ziehr et al (66 patients)	10 (8-12)	< 6	11	35 [3—43]	PF: 150-253 Compliance 32-36
Lieuwe et al (70)	10 (9-12)	423 (73.46)	10.5	48 (24.45)	N/A
Ferreira et al (1503, 20 sites)	10 (8-12)	6.5 (+/- 1.3)	13	31 [24-40] No evidence of bimodal response	Used in 36% of patients
Botta et al (n=553, 31 sites)	14 (11-16)	6.3 (5.7-7.1)	16	31.9 (26-40)	Proning 53% of patients used for first 4 days
Ferrando et al (n=742, 36 sites)	12 (11-14)	6.9 (6.3-7.8)	12 (10-16)	35 (27-45)	Proning in 76% of patients
Take Home	• Initial suggestions that there were different ventilatory phenotypes no supported by empirical evidence • Ventilated patient's with COVID pneumonia have similar respiratory mechanics to typical ARDS cohorts				

Ventilatory strategies

	Patients	Findings
Shuijt et al. (Mechanical power)	825 patients from PROVENT study with no spontaneous breathing	• Interaction of driving pressure and mechanical power • No co-linearity between two variable • High mechanical power associated with increase risk of mortality
Goligher et al. (Delta P)	1,096 patients from 5 previous Vt Trials.	• Posterior probablilty that lower Vt varied with elastance was 93% • Effect of reducing Vt further is driving pressure was < 15 not seen.
Mahmoud et al. (APRV)	60 patients, 8 sites. Fi02 > 0.7 . Retrospective	• P;F ratio increased from 100-130 wth use of APRV • Vt also increased from 6.5 – 7.6 ml/kg body weight
Mathews et al. (Proning)	2,238 retrospective analysis of Stop-COVID cohort.	• Early proning (within 2 days) --> HR 0.84 (0.74-0.98) • No reporting
Take-home	• Conventional ARDS ‘protective’ ventilation is the most commonly used strategy in COVID-19 pneumonia • Early prone positioning may be beneficial , prospective data is lacking • A focus on driving pressure and mechanical power may improve outcomes.	

Outcomes

Outcome	Study and Participants	Findings
Barotrauma	McGuiness et al, retrospective analysis of ventilated patients with COVID-19 n=601	• Incidence of 15% of pneumothorax or pneumomediastinum in COVID • Compared to 11% of patient in 4 years preceding with ARDS • OR 2 for death when Barotrauma occurs
Mortality	Lim et al: Meta-anlysis of 69 studies 57,420 patients.	• Overall reported CFR was estimated as 45% (95% confidence interval [CI], 39–52%). • Definitive hospital outcome only available 13,120 (22.8%) of the total IMV patient population. • CFR was also higher in early COVID-19 epicenters. • Lots of heterogeneity.
Function	Daher et al, 18 survivors of COVID related ARDS	• TLC 94% of predicted (11) • 6MWT 463 • Low incidence of physical and neuropsychiatric deficits.
Take Home	• Barotrauma is a common complication and is associated with poor outcomes. • Mortality has been very high in ventilated patients although much data is earlier in the pandemic • Very limited follow-up data but patients can recover well.	

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