

Guideline-directed management of Pulmonary complications of COVID-19

Highlights

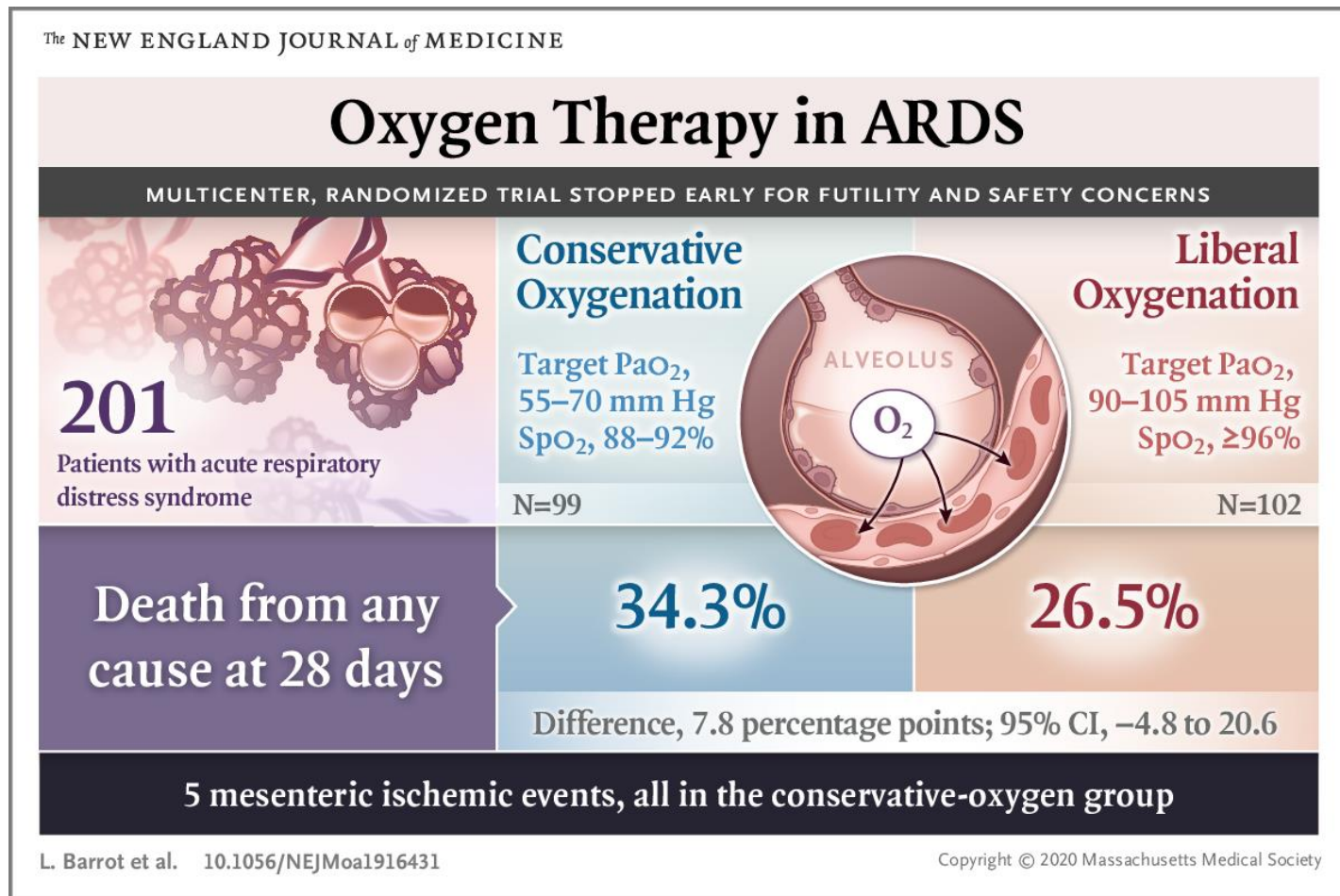
Support of Oxygenation in the setting of SARS-CoV2 infection

Recommendations:

23. In adults with COVID-19, we **suggest** starting supplemental oxygen if the peripheral oxygen saturation (SPO₂) is < 92% (weak recommendation, low quality evidence), and **recommend** starting supplemental oxygen if SPO₂ is < 90% (strong recommendation, moderate quality evidence).
24. In adults with COVID-19 and **acute hypoxemic respiratory failure on oxygen**, we **recommend** that SPO₂ be maintained no higher than 96% (strong recommendation, moderate quality evidence).

- **Titrate SpO2 to a range between 92-96%**
 - Chu *et al* in a 2018 meta-analysis of 25 RCTs in 16,000 critically ill pts requiring supplemental O₂, higher target SpO₂ >96% associated with increased mortality without improvement in other outcomes
 - In the LOCO₂ trial ARDS pts randomized to conservative (88-92%) vs liberal (≥96%) O₂ arms—stopped early due to deaths in the conservative arm

Support of Oxygenation in the setting of SARS-CoV2 infection



The role of high flow nasal cannula

Recommendation:

25. For adults with COVID-19 and **acute hypoxemic respiratory failure** despite conventional oxygen therapy, we **suggest using** HFNC over conventional oxygen therapy (weak recommendation, low quality evidence).

- **HFNC: May reduce # of intubations, probably doesn't reduce mortality or hospital LOS, probably doesn't increase risk of transmitting SARS-CoV2 significantly.**
 - Rochwerg *et al* in a meta-analysis of 9 RCTs (2093 pts) found in patients randomized to HFNC vs NC:
 - RR for intubation was 0.85 (95% CI 0.74-0.99)
 - RR for mortality was 0.94 (95% CI 0.67-1.31)
 - In an analysis of HCW transmission in the 2003 Toronto SARS-CoV outbreak, HFNC was not noted to be associated with increased risk of transmission, however NIPPV and other activities were

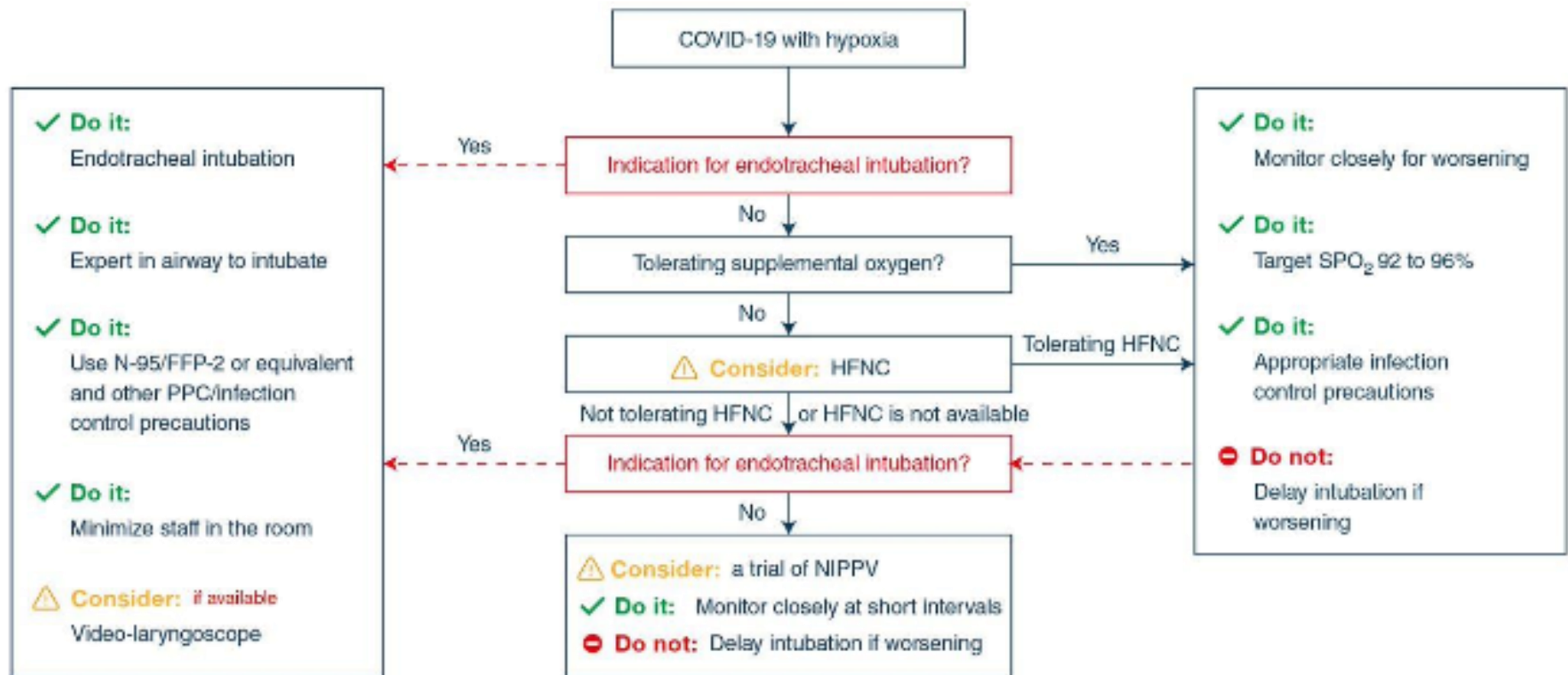
The role of non-invasive positive pressure ventilation (“CPAP” or “BiPap”)

Recommendation:

26. In adults with COVID-19 and acute hypoxemic respiratory failure, we suggest using HFNC over NIPPV (weak recommendation, low quality evidence).

- **NIPPV: Avoid BiPap as much as possible unless the patient’s underlying comorbidities (e.g. COPD) strongly favor its use**
 - Extrapolating from data on 302 critically-ill MERS pts, **92% of patients initiated on NIPPV ultimately required endotracheal intubation** with no difference in mortality or ICU LOS
 - In a meta-analysis of 1084 patients in 8 RCTs looking at **HFNC vs NC or NIPPV prior to consideration of mechanical ventilation, both were inferior to HFNC**
 - **OR for requiring intubation 0.48 for HFNC vs NIPPV (CI 0.31-0.73, p=0.0006)**
 - **OR for ICU mortality 0.36 for HFNC vs NIPPV (CI 0.2-0.63, p=0.0004)**

Support of Oxygenation/Ventilation in the setting of SARS-CoV2 infection



The mechanism of SARS-CoV2 infection is functionally ARDS

Recommendation:

30. In mechanically ventilated adults with COVID-19 and ARDS, we **recommend** using low tidal volume (V_t) ventilation (V_t 4-8 mL/kg of predicted body weight), over higher tidal volumes ($V_t > 8$ mL/kg) (strong recommendation, moderate quality evidence).

Recommendation:

31. For mechanically ventilated adults with COVID-19 and ARDS, we **recommend** targeting plateau pressures (P_{plat}) of < 30 cm H_2O (strong recommendation, moderate quality evidence).

- **SCCM recommends treating all intubated SARS-CoV2 patients using ARDS protocol**
 - A tidal volume of 6cc/kg ideal body weight is the target, but can go even lower with goal pH > 7.3
 - If Peak pressure is consistently < 30 , plateau must be < 30 so usually don't need to check
 - Try to wean FiO_2 before PEEP (stepwise decrement in both, target $FiO_2 < 50\%$, PEEP 5)
 - With very low tidal volume, “double triggering” is common and deep sedation or muscle relaxation is often needed
 - In ARDS pulmonary capillaries are leaky—**watch I/O very carefully** and try to concentrate drips or use bolus doses of sedatives to minimize volume in; “dry lungs are happy lungs”

The mechanism of SARS-CoV2 infection is functionally ARDS

Conduct a SPONTANEOUS BREATHING TRIAL daily when:

1. $FiO_2 \leq 0.40$ and $PEEP \leq 8$ OR $FiO_2 \leq 0.50$ and $PEEP \leq 5$.
2. PEEP and $FiO_2 \leq$ values of previous day.
3. Patient has acceptable spontaneous breathing efforts. (May decrease vent rate by 50% for 5 minutes to detect effort.)
4. Systolic BP ≥ 90 mmHg without vasopressor support.
5. No neuromuscular blocking agents or blockade.

SPONTANEOUS BREATHING TRIAL (SBT):

If all above criteria are met and subject has been in the study for at least 12 hours, initiate a trial of UP TO 120 minutes of spontaneous breathing with $FiO_2 \leq 0.5$ and $PEEP \leq 5$:

1. Place on T-piece, trach collar, or CPAP ≤ 5 cm H₂O with PS ≤ 5
2. Assess for tolerance as below for up to two hours.
 - a. $SpO_2 \geq 90$: and/or $PaO_2 \geq 60$ mmHg
 - b. Spontaneous $V_T \geq 4$ ml/kg PBW
 - c. RR ≤ 35 /min
 - d. pH ≥ 7.3
 - e. No respiratory distress (distress= 2 or more)
 - HR > 120% of baseline
 - Marked accessory muscle use
 - Abdominal paradox
 - Diaphoresis
 - Marked dyspnea
3. If tolerated for at least 30 minutes, consider extubation.
4. If not tolerated resume pre-weaning settings.

Lower PEEP/higher FiO2

FiO₂	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO₂	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/lower FiO2

FiO₂	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO₂	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24