COVID-19: Highlights of Emerging Evidence for ICUs

14 to 23 April 2020

The publications below have been selected from three sources: (i) a search of COVID-19 literature published since 14 April 2020, (ii) websites publishing COVID-19 rapid reviews (Cochrane, CEBM, Evidence Aid, HSE Ireland), (iii) 'hand' search of specific websites for grey literature resources.

This is not a systematic review of all published literature and not a clinical guideline but an update of latest published studies

Ventilation

Journal article: COVID-19 pneumonia: different respiratory treatments for different phenotypes?

A conceptual model for respiratory treatments based on case observations and discussion

Hypothesis: COVID-19 pneumonia does not fit unequivocally with the ARDS definition. There is a time-related disease spectrum within two primary phenotypes:

- ***Type L*: Low elastance (i.e., high compliance), Low ventilation-to-perfusion ratio, Low lung weight and Low recruitability**
- ***Type H*: High elastance, High right-to-left shunt, High lung weight and High recruitability**
- **There is a *transition* between phenotypes. Type L moving to Type H. Due to evolution of COVID-19 pneumonia OR due to the injury attributable to high-stress ventilation.**

Clinically: Type best identified by CT scan. If no CT: use respiratory system elastance and recruitability.

- *Type L*: viral infection → modest local subpleural interstitial oedema (ground-glass lesions) at the interfaces between lung structures with different elastic properties, where stress/strain concentrated. Vasoplegia → severe hypoxemia. Normal response to hypoxemia is to increase minute ventilation (increasing the tidal volume: up to 15–20 ml/kg), associated with > negative intrathoracic inspiratory pressure. Near normal compliance explains why some of the patients present without dyspnoea.
- *Type H*: 20–30% of patients in our series. These patients fully fit the severe ARDS criteria: hypoxemia, bilateral infiltrates, decreased the respiratory system compliance, increased lung weight and potential for recruitment.

Respiratory treatment:

- *Type L:* No dyspnoea: reverse hypoxaemia with increased FiO2. Dyspnoea: HFNC, CPAP or NIV. Measurement (or estimation) of inspiratory oesophageal pressure swings crucial (absence oesophageal manometry: surrogate measures work of breathing: swings of CVP, clinical detection of excessive inspiratory effort). In intubated patients: determine P0.1 and $P_{occlusion}$. High PEEP may decrease pleural pressure swings and stop cycle that exacerbates lung injury. However, high PEEP in normal compliance → detrimental effects on haemodynamics.
- *Transition:* Determined by magnitude of inspiratory pleural pressures swings. Oesophageal pressure swings increase from 5 - 10 cmH_2O (generally well tolerated). >15 cmH_2O, risk lung injury increases → intubation.
- *Type L intubated*: Hypercapnic: ventilate volumes >6 ml/kg (up to 8–9 ml/kg), high compliance results in tolerable strain without the risk of VILI. Prone positioning as rescue manoeuvre. PEEP reduced 8–10 cmH_2O, given recruitability low, risk hemodynamic failure increases at higher levels. Early intubation of Type L may avert transition to Type H.
- *Type H: T*reat as severe ARDS: higher PEEP (if tolerated), prone positioning and ECMO

*This conceptual model has been incorporated into a diagrammatic management flowchart in a commentary '**Ventilation of COVID-19 patients in intensive care units',** published 20 April 2020:*
https://link.springer.com/article/10.1007/s00059-020-04923-1

Published: 14/04/2020
Accessible: https://link.springer.com/article/10.1007/s00134-020-06033-2

Review: Recommendation for a practical guideline for safe tracheostomy during the COVID-19 pandemic

A literature review and proposed practical guideline based on a tertiary healthcare institution with 195 critical care admissions for COVID-19 up until 4th April 2020

In selected COVID-19 patients there is a role for tracheostomy to aid weaning. Both percutaneous and surgical techniques can be performed safely with modification to technique, enhanced PPE and utilising ENT surgical colleagues in forming tracheostomy teams. With respect to prognosis, viral load and staff safety it is recommended tracheostomies are not performed until 14 days after endotracheal intubation.

There is currently no evidence whether percutaneous or surgical tracheostomy is less aerosol generating. Avoidance of multiple entries into the trachea and disruption to ventilation is felt to be beneficial, which can be achieved both surgically and through the 'Rhino' dilator technique.

Published: 21/04/2020
Accessible: https://link.springer.com/article/10.1007/s00405-020-05993-x

Journal Article: Neurologic Features in Severe SARS-CoV-2 Infection

Single centre observational series of 58 COVID-19 ICU patients with ARDS in Strasbourg, France

- **Patient characteristics**: Median age 63. 7 patients had previous neurologic disorders (TIA, partial epilepsy, mild cognitive impairment).
- **Neurological features**: 69% (n=58) had agitation on withdrawal of neuromuscular blockade: 65% (n=40) had confusion; 65% (n=58) had diffuse corticospinal tract signs. 36% (n=39) had dysexecutive syndrome on discharge (inattention, disorientation or poorly organised movements in response to command).
- **Investigations**: MRI (n=13): Leptomeningeal enhancement in 62%, perfusion abnormalities in 100%, cerebral ischemic stroke in 23%. CSF analysis (n=7): oligoclonal bands with the same pattern in serum 29%, elevated CSF IgG and CSF protein levels 14%, low albumin level 57%, negative RT-PCR for SARS-CoV-2 100%.
- **Conclusion**: ARDS due to SARS-CoV-2 infection was associated with encephalopathy, prominent agitation and confusion, and corticospinal tract signs. Only 2 had acute ischaemic stroke identified. Data are lacking to determine which of these features were due to critical illness–related encephalopathy, cytokines, or the effect or withdrawal of medication, and which features were specific to SARS-CoV-2 infection.

Published: 15/04/2020
Accessible: https://www.nejm.org/doi/pdf/10.1056/NEJMc2008597?articleTools=true

Guidance: RCPsych Faculty of Old Age Psychiatry guidance on delirium in COVID-19

Delirium may be a presenting symptom in COVID-19, older adults are at particular risk of delirium as well as COVID-19. Hyperactive delirium may present particular challenges in the current COVID crisis as well as isolation environments and PPE, in addition, there are some particular considerations associated with the pharmacological interactions of sedating drugs and those used in the treatment of COVID-19.

Dated: 28/03/2020
Accessible: https://www.rcpsych.ac.uk/docs/default-source/members/faculties/old-age/COVID-19-delirium-management-guidance.pdf?sfvrsn=2d5c6e63_2

Resource: Critical Care COVID-19 Communication Chart

Effective communication an important strategy in the prevention & management of delirium. The ICM Anaesthesia COVID-19 group have shared the communication chart below to use with critically ill patients, even if the patient is being ventilated or has a tracheostomy (but is alert).

Published: 21/04/2020
Accessible: https://icmanaesthesiaCOVID-19.org/critical-care-COVID-19-communication-chart