Sharing COVID-19 Experience:
Improving ICU Management

ICU / NHS Nightingale teleconference (April 6-2020)
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NOTE: THE NOTES AND SUGGESTIONS IN THIS PRESENTATION ARE SUGGESTIONS AND INFORMATION-SHARING FROM THE PARTICIPANTS OF THE TELECONFERENCE. THEY ARE MEANT TO INFORM THE CLINICIANS OF THE CHALLENGES AND SOLUTIONS OBSERVED BY THE PARTICIPANTS. THE RECOMMENDATIONS SHOULD NOT BE INTERPRETED AS EVIDENCE-BASED INFO, BUT EXPERIENCE SHARING WHILE THE CLINICAL STUDIES ARE UNDERWAY.

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Ventilation (1)

- Early high PEEP is probably not the right strategy and may be harmful → this is not ARDS in the early phase of the illness
- Avoid spontaneous ventilation early in ICU admission as this may also be harmful
- There is clear microvascular thrombosis happening in the pulmonary circulation, which leads to an increased dead space
- Also some evidence of early pulmonary fibrosis reported from Italy, possibly oxygen and inflammation related
- Not many patients have reached extubation yet in Londen, re-intubation seems to be common
- Brompton are seeing wedge infarcts in the lungs on imaging, along with pulmonary thrombosis without DVT

Ventilation (2)

- Proning is essential and should be done early, do not just do it once → threshold for many centres is a PaO_2/FiO_2 ratio of 13, but all agreed, do it even earlier
  - Early on in the disease, the benefit of proning lasts <4 hours when turned back to supine
  - As the disease progresses into a more ARDS type picture, the effect is more long-lasting
- Many centres using inhaled nitric oxide and prostacyclin with good effect → tachyphylaxis with NO after 4-5 days
- Generally, people are using humidified circuits with HMEs
- A very interesting thing they are doing at Georges is cohorting by phase of disease (i.e., early, late, extubation/trachy) → it involves more moving of patients but helps each team to focus on things more easily
- Leak test before extubation is crucial, others are also seeing airway swelling
- Wait longer than usual before extubating, high re-intubation rates reported → do not extubate if inflammatory markers are still high

Conclusions ventilation

- Less aggressive PEEP strategy at the beginning of the disease and go straight for proning
- Thromboembolic disease is prevalent, look for it → no one is sure about whether we should anticoagulate everyone, this is probably too risky
- An extubation protocol is needed immediately
- We should consider using inhaled prostacyclin again (like we previously did) as it seems to be working early in the disease

Fluid balance

- All centres agreed that we are getting this wrong
- Most patients come to ICU after a few days of illness where their temperature was 38-40°C and they were hyperventilating (i.e., severly dehydrated)
- High rates of acute kidney injury (AKI) being caused by over zealous driving with furosemide, leading to unneccessary continuous venovenous hemofiltration (CVVHF)
- Hypovolemia leads to poor pulmonary perfusion and increased dead space
- Centres echo'ing their patients are seeing a lot of RV dysfunction without raised pulmonary artery pressure
- Many have improved oliguria by dropping the PEEP (i.e., these patients are really hypovolemic) → on night I have observed many of our patients with a zero fluid balance and temperature of 39 (i.e., they will be 2-3 litres negative in reality)
- Most centres are therefore now backing off of strict zero balance, particularly in hyperpyrexia → moving towards avoidance of large positive fluid balance
- Lung "leak" not as prominent in this disease as classic ARDS

Conclusions fluid balance

- Avoid hypovolemia as it will impede gas exchange and cause AKI

  → progression to CVVHF increases mortality

- Avoid hypervolemia

- How we achieve this is difficult, but the furosemide and noradrenaline cocktail needs to be carefully tailored, especially in pyrexial patients

- Echo patients to understand their volume status

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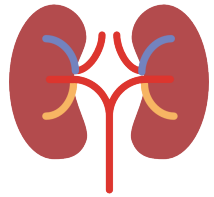
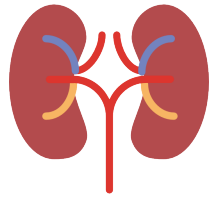
Renal



- Higher than predicted need for CVVHF - ? Due to excess hypovolemia
- Microthrombi in kidneys probably also contributing to AKI
- CVVHF circuits clot frequently
  - Georges and Kings now fully anticoagulate the patient (rather than the circuit) as it is the only way they can prevent this
  - One centre uses full dose LMWH as they have run out of pumps
- Kings now beginning acute peritoneal dialysis (PD) as running out of CVVHF machines

Conclusions renal

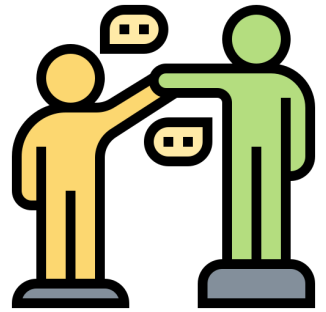


- Aggressive anticoagulant strategy required for CVVHF, potentially systemic
- If we run out of machines, PD may / may not help (our previous experiences with it are not great, but I have no alternative other than using CVVHF like intermittent dialysis and sharing machines)

Workforce

- A “tactical commander” is essential on every shift, who is not directly responsible for care of ICU patients
- Most centres now getting towards 1:6 nursing ratio with high level of support workers on ICU
- Training has largely fallen by the wayside as it is too large a task

  → people are being trained on the job



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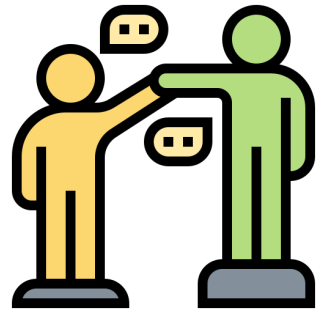
Conclusions workforce

- On call consultant to coordinate but not be responsible for patients (as is the model we have now adopted)
- We need one support worker per patients → other centres are using everyone they have from medical students to dental hygienists



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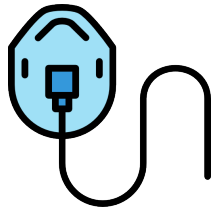
CPAP



- Proning patients on CPAP on the ward is very effective
- Prolonged use of CPAP **may** lead to patients being more systemically unwell when they get to ICU
- Considerable oxygen supply issues with old school CPAP systems

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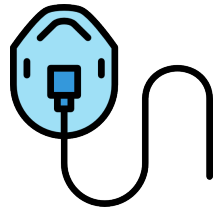
Conclusions CPAP



- As per local guidelines, assess the effectiveness of CPAP after an hour
  - If it is not effective then bail out and consider intubation
  - If effective, regular review is required → if at any point it is failing, bail out and consider ventilation
- Whilst we may have shortage of ventilators, holding people indefinitely on CPAP may be short-sighted as it may be converting single organ failure into multiple organ failure