Lessons learnt from the use of CPAP for patients with type 1 respiratory failure due to COVID-19 pneumonia in a district general hospital outside a critical care setting

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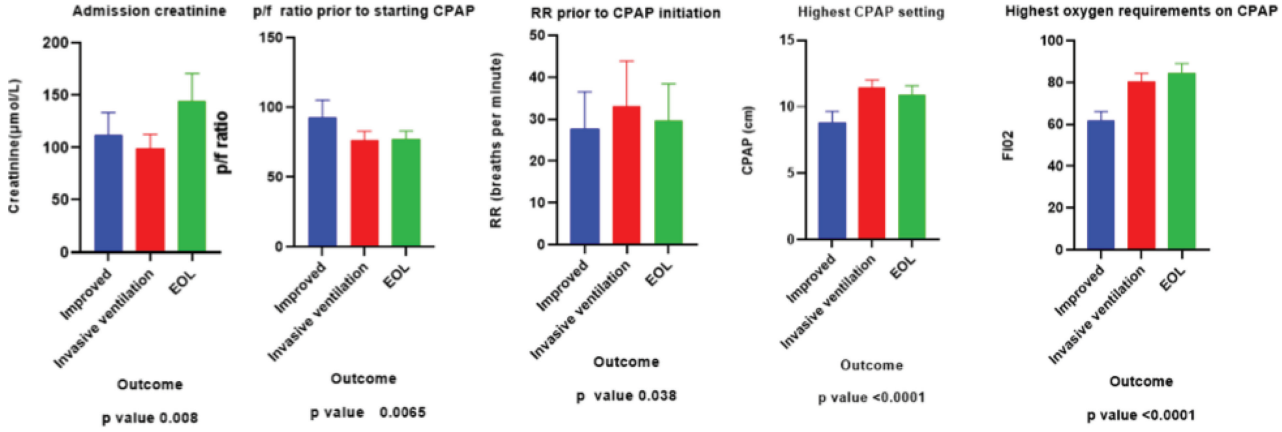

Fig 1. Association of variables with outcomes of continuous positive airway pressure treatment for respiratory failure due to COVID-19 pneumonia.

Introduction

During the COVID-19 pandemic, continuous positive airway pressure (CPAP) was used as a bridge to invasive mechanical ventilation (IMV) or as ceiling of care to treat COVID-19 pneumonia and could be provided outside the critical care setting. From 07 March 2020 to 03 May 2020, 140 patients received CPAP outside critical care at Croydon University Hospital (CUH). Patients were managed on a specialist respiratory ward in closed bays. The aim of our study was to analyse the association of patient factors with successful outcome from CPAP treatment in an expanded specialist respiratory unit at CUH, a large London district general hospital with limited critical care capacity.

Method

The outcomes of all patients treated with CPAP were recorded: 1 = improved, 2 = required IMV and 3 = progressed to end of life (EoL). The association of factors including demographics, admission creatinine, D-dimer, C-reactive protein, highest positive end-expiratory pressure (PEEP) and respiratory rate with outcome were analysed using one-way analysis of variance.

Results

Thirty-four per cent of CPAP patients required IMV (of whom 38% survived); 41% died (including patients for whom CPAP was the ceiling of care); 24% improved without IMV. Fig 1 shows that higher admission creatinine level, higher arterial partial pressure of oxygen (pO_2) / fraction of inspired oxygen (FiO_2; p/f ratio), higher respiratory rate prior to starting CPAP, higher PEEP and higher FiO_2 were associated with a worse outcome (ie IMV or EoL). Eighty-one per cent of patients had a treatment escalation plan within 24 hours of admission using the clinical frailty score (CFS) to guide decisions.[1] Black, Asian and minority ethnic patients were overrepresented compared with the local population (local White 55% vs 28% CPAP patients White); Black patients were the most comorbid. Ethnicity was not significantly associated with outcome in this study (Fig 1).[2]

Conclusion

CPAP is a vital intervention in the treatment of COVID-19 pneumonia. A number of lessons were learnt from providing

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CPAP outside of critical care setting. The significance of admission creatinine and outcome suggests prolonged periods of inadequate nutrition/hydration in a high metabolic state likely worsen outcomes and should be avoided, and that organ systems other than the lungs are involved in COVID-19. Cautious sedation may improve tolerance in awake patients on continuous CPAP. Other lessons learnt included thrombotic risk management, use of awake proning and early involvement of palliative care. ■

Conflicts of interest

None declared.

References

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2 Croydon Observatory. *Croydon household profile report*. Croydon Observatory, 2013.