Continuous positive airway pressure (CPAP) as a ceiling of care treatment for hypoxaemic respiratory failure due to COVID-19

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Table 1. Patient factors and 30-day mortality

	Overall, n=70	Alive at 30 days, n=21	Dead at 30 days, n=49	p value[a]
Female	24 (34.3%)	8 (38.1%)	16 (32.7%)	0.79
Rockwood clinical frailty score >4	42 (60%)	12 (57.1%)	30 (61.2%)	0.79
Age, years	76 (69–80)	71 (66–80)	77 (69–82)	0.20
Pre-CPAP C-reactive protein	162 (101–220)	170 (90–279)	162 (109–199)	0.74
Pre-CPAP white blood cell count, × 10^9/L[b]	8.2 (5.0–12.7)	8.2 (6.0–9.6)	8.4 (4.4–12.9)	0.92
Pre-CPAP lymphocytes, × 10^9/L[b]	0.6 (0.4–1.0)	0.6 (0.4–1.0)	0.6 (0.4–1.0)	0.89
Pre-CPAP fraction of inspired oxygen, %	60 (40–80)	58 (40–60)	60 (50–80)	0.16

Binomial/ordinal factors are presented as number (%) and continuous factors as median (IQR). [a] = p values calculated with Fisher's exact test for binomial/ordinal factors, and using the Wilcoxon rank-sum test for continuous factors; [b] = excluding 1 patient with acute lymphocytic leukaemia with a lymphocyte count of 139.

Introduction

COVID-19 causes a wide spectrum of disease, which at its most severe can lead to hypoxaemic respiratory failure necessitating respiratory support. While guidelines recommend CPAP as a treatment option for such patients, including those for whom CPAP is the ceiling of care, there are no controlled trials informing this practice.[1] The current RECOVERY-RS trial is assessing the use of CPAP for COVID-19, but excludes patients considered unsuitable for invasive ventilation.[2] Those caring for such patients with COVID-19 in the ward setting must balance the potential benefits of CPAP against the burdens imposed by it; data in this patient population are urgently needed.

Materials and Methods

We collected data on all patients commencing CPAP as a ceiling of care treatment for hypoxaemic respiratory failure due to COVID-19 on the wards of two UK teaching hospitals during the first two months of the COVID-19 pandemic. The primary outcome was 30-day all-cause mortality. Secondary outcomes were duration of CPAP treatment, reasons for CPAP discontinuation, and duration of admission. Data about factors prior to and during CPAP treatment were collated, and their relationship with 30-day mortality tested for statistical significance using standard non-parametric methods.

Results and Discussion

Seventy patients received CPAP as a ceiling of care treatment during this period, of whom 49 (70%) died within 30 days. There were no significant associations between patient factors and 30-day mortality (Table 1). Twenty-one patients (30%) initiated their own withdrawal from CPAP, and three (4.3%) died on CPAP. Those patients who survived to 30 days required a median of 5 days on CPAP (interquartile range (IQR) 2–9) and 23 days in hospital (IQR 15–26).

This was a pragmatic multi-centre observational study examining clinically relevant endpoints in this understudied population of patients deemed not suitable for invasive ventilation. It was limited by a small sample size and lack of a control group. However, with no randomised controlled trials or case-control studies yet published in this patient group, we hope our data can add to the limited body of evidence available to inform practice.

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Conclusion

Patients treated with CPAP as a ceiling of care for COVID-19 associated respiratory failure have a high mortality, and a significant proportion choose to stop treatment. In our cohort, neither patient factors nor CPAP settings predicted 30-day mortality. Further work is needed, including larger studies, comparison with other management strategies for such patients, and exploration of the physical and psychological effects of CPAP on patients and staff. ■

Conflicts of interest

None declared.

References

1 NHS England. *Guidance for the role and use of non-invasive respiratory support in adult patients with COVID-19 (confirmed or suspected)*. NHS, 2020. www.nice.org.uk/Media/Default/About/COVID-19/Specialty-guides/specialty-guide-NIV-respiratory-support-and-coronavirus.pdf [Accessed 27 November 2020].

2 University of Warwick. *RECOVERY-RS Respiratory Support: Respiratory strategies in COVID-19; CPAP, high-flow, and standard care*. University of Warwick, 2020. https://warwick.ac.uk/fac/sci/med/research/ctu/trials/recovery-rs/ [Accessed 1 Jul 2020].