COVID-19-related changes in outpatient CPAP setup pathways for OSA are linked with decreased 30-day CPAP usage

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ABSTRACT

The COVID-19 pandemic changed continuous positive airway pressure (CPAP) setup pathways. We evaluated patients commenced on CPAP in 2019 (prepandemic) and 2020 (post-first UK wave). Face-to-face (F2F) setup numbers, with CPAP turned on, decreased from 613 patients (98.9%) in 2019, to 6 (1.1%) in 2020. In 2020, setups were F2F without CPAP turned on (403 (71.1%)), or remote (158 (27.9%)). Prepandemic median CPAP usage at first follow-up was 5.4 (2.7–6.9) hours/night and fell by 0.9 hours/night (95% CI 0.5 to 1.2, p<0.0001) in 2020. We found clinically relevant reductions in CPAP usage with pathway changes post-COVID-19.

The COVID-19 pandemic changed the management of patients with obstructive sleep apnoea.[1] Previously, continuous positive airway pressure (CPAP) was set up face-to-face (F2F). Experienced healthcare professionals provided education and support, and the CPAP device was switched on. This allowed patients to experience the often initially uncomfortable sensations while under supervision and have any fears allayed.[2] However, CPAP is an aerosol-generating procedure and so in-hospital use was limited by COVID-19 infection prevention and control (IPC) guidance,[3 4] meaning it was not possible to routinely conduct F2F CPAP trials with the device switched on. The pandemic triggered other pathway changes, including the use of home sleep studies, and remote clinician consultation, monitoring and follow-up appointments. The impact of these pathway changes is not known, and we aimed to see their effect on CPAP usage.

We conducted a multicentre retrospective service evaluation of secondary care sleep units. We included consecutive patients commenced on CPAP in July–August 2019 (prepandemic) and July–August 2020 (post-UK first-wave).

Primarily, we evaluated the hours of CPAP usage on 30 nights prior to first follow-up in 2020 compared with 2019. Change in hours of usage was modelled using linear regression and expressed as mean (95% CI) and adjusted for potential confounders of age, gender, ethnicity, centre, log transformed 4% oxygen desaturation index (ODI) and baseline Epworth Sleepiness Score (ESS). Exploratory evaluations compared the difference in CPAP usage between F2F setups without CPAP turned on and that of entirely remote setups in 2020, and compared CPAP usage by time from sleep study to CPAP setup in 2019 and 2020 separately.

Secondarily, we evaluated changes in ESS, CPAP adherence (proportion of patients with CPAP usage >4 hours/night on ≥70% of nights), and the number of sleep clinic contacts made in the first month.

RESULTS

In 2019 and 2020. respectively, 620 and 567 patients were included from 8 centres (table 1). There were differences in populations between centres in the baseline ODI and ESS. The median ODI by centre ranged from 14.7/hour (IQR 11.2–33.4) to 29.1/hour (IQR 17.0–44.9) and median baseline ESS ranged from 9 (IQR 5–13) to 14 (IQR 9–16) points. The mean age was comparable between centres, ranging from 51.2±12.9 to 56.3±14.5 years.

In 2019, CPAP setup was F2F with CPAP machine turned on in 613 patients (98.9%). By contrast, in 2020, only six patients (1.1%) had F2F setup with CPAP turned on, while 403 (71.1%) had F2F setup without CPAP being turned on, and 158 (27.9%) had entirely remote setup.

Sleep study methods were similar in 2019 vs 2020; home polygraphy 378 (61.0%) vs 328 (57.8%), laboratory polygraphy/polysomnography 85 (13.7%) vs 92 (16.2%) and pulse oximetry 142 (22.9%) vs 131 (23.1%; χ^2=1.9, df=3, p=0.59). Time from sleep study to CPAP setup increased in 2020 to a median (first quartile, third quartile) of 141 (35, 202) days from 76 (47, 105) days in 2019 (mean difference 45 days; 95% CI 35 to 55; p<0.0001). Time to first follow-up following commencement on CPAP decreased in 2020 to a median of 22 (15, 31) days, from 30 (17, 38) days in 2019 (mean difference −11 days; 95% CI −15 to −6; p<0.0001). Telephone follow-up increased from 21% to 88% within the studied period (figure 1).

Median CPAP use was 5.4 (2.7–6.9) hours/

Table 1 Baseline characteristics from patients

	2019	2020
Total	620	567
Age (years)	53.4±13.6	53.4±13.3
Gender		
Female	206 (33.2%)	185 (32.6%)
Male	414 (66.8%)	380 (67.0%)
Ethnicity		
White	476 (76.8%)	383 (67.5%)
Asian	18 (2.9%)	12 (2.1%)
Black	10 (1.6%)	10 (1.8%)
Other	7 (1.2%)	5 (0.9%)
Unknown	109 (17.6%)	157 (27.7%)
BMI (kg/m^2)	34.9 (30.6, 41.0)	34.8 (29.5, 40.4)
ESS	11.2±5.5	11.8±5.2
ODI (/hour)	23.0 (14.1, 43.0)	21.5 (13.0, 41.8)
AHI (/hour)	25.5 (15.0, 40.4)	25.7 (14.5, 46.8)

Data are expressed as mean±SD, median (first quartile, third quartile) or number (percentage), as appropriate.
AHI, Apnoea–Hypopnoea Index; BMI, body mass index; ESS, Epworth Sleepiness score; ODI, Oxygen Desaturation Index ≥4%.

night in 2019 and 4.2 (1.4–6.1) hours/night in 2020, falling by 0.9hours/night (95% CI 0.5 to 1.2, p<0.0001) in 2020. The result was similar following adjustment for potential confounders (−0.6 hours/night, 95% CI −0.3 to −1.2, p=0.0006, n=871). In 2020, CPAP usage with remote setup was lower compared with F2F setup (−0.6 hours/night, 95% CI −1.1 to −0.1, p=0.03, n=438). There were no significant differences in mean CPAP usage by quartile of time from sleep study to CPAP setup in either 2019 (Quartile 1 (Q1) 4.7±2.6 hours/night, Q2 4.9±2.6 hours/night, Q3 4.8±2.5 hours/night, Q4 4.3±2.8 hours/night; F=0.86, df=3, p=0.46, n=479) or 2020 (Q1 4.3±2.7 hours/night, Q2 4.1±2.5 hours/night, Q3 4.1±2.8 hours/night, Q4 3.6±2.7 hours/night; F=1.78, df=3, p=0.15, n=443).

In 2019, 244 of 458 patients were adherent with CPAP (53.3%, 95% CI 48.7% to 57.8%) falling to 202 of 490 in 2020 (41.2%, 95% CI 36.9% to 45.6%; χ^2=13.8, df=1, p=0.0002).

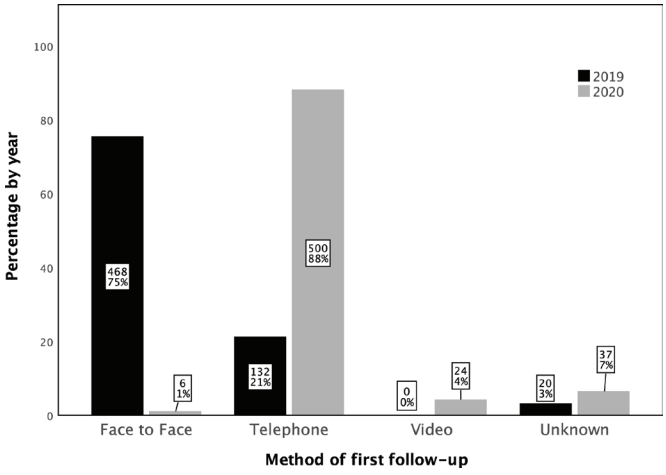

Figure 1 Method of first follow-up in 2019 and 2020. There was significant difference in the proportions of face-to-face, telephone and video follow-up from 2019 to 2020 (χ^2=692.7, df=3, p<0.0001).

Data were frequently missing for the ESS (56%) and sleep clinic contacts (40%) and, as such, we have not stated formal statistical comparisons for these outcomes.

DISCUSSION

In our multicentre, UK-based service evaluation, pathway changes to CPAP setup due to COVID-19 related IPC procedures were linked with clinically relevant reductions in CPAP usage. In 2020, entirely remote CPAP setup was associated with low usage.

To our knowledge, there have been no studies assessing the effect of the COVID-19 pandemic on CPAP usage in those newly commencing CPAP. Small increases in CPAP usage during COVID-19 lockdowns have been reported in established users.[5 6] In contrast we found lower CPAP usage in patients newly started on CPAP after the first wave of the COVID-19 pandemic.

The reasons why changes to CPAP pathways in 2020 were associated with reduced usage are not clear. The key changes were initial remote consultations, and either remote setup or in-person setup without CPAP being turned on. Remote setup was associated with particularly low usage. Possible reasons for this include reduced personal interaction and less educational provision. Remote CPAP setup has not been previously studied, unlike remote follow-up with telemonitoring which increases adherence.[7 8] Therefore, the increasing use of remote follow-up we observed in 2020 was unlikely to have undermined CPAP usage.

There were large delays in CPAP setup in 2020, meaning that treatment was often delayed beyond the national 18-week referral to treatment target. Delayed CPAP setup may have contributed to low CPAP usage, alongside pathway changes, however, time from sleep study to CPAP setup was not associated with CPAP usage in 2019 or 2020.

There are strengths and limitations to our service evaluation. We included multiple sites across the UK and captured consecutive patients starting CPAP, increasing generalisability. However, the retrospective design led to a high proportion of missing data for ESS scores and sleep clinic contacts, precluding analysis of these outcomes. There were many different changes to CPAP setup pathways and variation in practice across centres meaning that our study cannot determine the cause of lower CPAP use in 2020. While we have discussed some of the factors, which may have influenced CPAP usage, we cannot account for other confounders that might have influenced CPAP usage.

Nevertheless, our results demonstrate a concerning fall in CPAP usage associated with pathway changes for the post-COVID era, suggesting an urgent need to identify which components are critical to promoting CPAP adherence. Pathway changes were widespread, including remote physician consultations, home sleep studies, stopping F2F setup with CPAP turned on, and remote follow-up. While we do not know the individual impact of each change, lower CPAP usage with entirely remote setup suggests that key elements of F2F CPAP setup are critical. Going forward, it is essential we do not automatically replace traditional pathways with new methods of CPAP setup, unless there is evidence of non-inferiority.

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