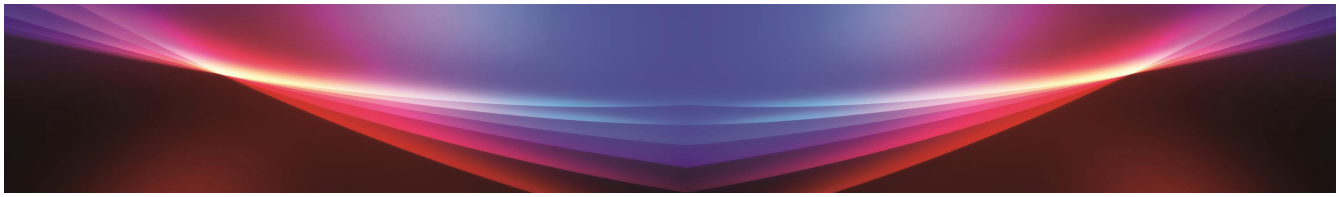

SUPPLEMENTARY MATERIAL

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Comparison among three different follow-up models for obstructive sleep apnea syndrome patients: focus on the physiotherapist's role

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In-depth description of the three different paths

Physician-oriented follow-up (P-F)

In the P-F model, the titration to CPAP was completed during hospitalization, either in inpatient or outpatient, based on the patient's needs and preferences. The indication to initiate CPAP was posed by the pulmonologist according to the inclusion criteria. The pulmonologist explained the treatment to the patients and obtained consent to the procedure. Therefore, an AutoCPAP was set up and the interface was chosen by the PT, who also educated the patients on how to use the device, wear the mask, and set up humidification. The patients performed a diurnal trial with AutoCPAP and therefore initiated its nocturnal utilization. After at least four nights of pressure titration by AutoCPAP, compliance, and efficacy data were downloaded from the device, analyzed by the PT and the pulmonologist, and used for CPAP setup. After further three or four nights of good CPAP utilization, a nocturnal sleep cardiopulmonary monitoring was performed and, when a good correction of OSAS was found, the CPAP and interface used were prescribed to the patient. Before completing the prescription, the PT performed a formal educational session with the patient and caregiver (when needed), about CPAP and mask use and domiciliary management. More details about this titration and educational process were described elsewhere (14). Therefore, patients adapted to CPAP entered the physician-oriented follow-up (P-F). This model was temporally the first applied in our medical center. It provided that, once the titration to CPAP was completed and the home device was prescribed, the patient was indicated to book a pulmonologist's visit within four months from the beginning of CPAP home utilization, to verify residual symptoms with the use of the Epworth Sleepiness Scale (ESS) (15), the short-term

adherence (usage time) and efficacy (leaks and AHI under CPAP), and to exclude any problem that arose early during use through a dedicated questionnaire filled by the patient, investigating his/her comfort and reporting any problem. If no problems were found, the patient returned for the annual follow-up medical visit. If problems with CPAP usage were encountered, the pulmonologist carried out resolutive actions such as, for example, variation of the ventilatory settings, change of the mask, suspension of the same if not tolerated, prescription of diagnostic tests, and more.

PT-oriented follow-up (PT-F)

In 2018, the previous follow-up model was no longer sustainable due to a substantial increase in the number of CPAP prescribed. The pulmonologist's visit to monitor the adherence to CPAP within the first few months after the device delivery was no longer possible, due to long waiting lists. In the meanwhile, the CPRS developed a good experience with CPAP usage and mask delivery. After the completion of titration, education to CPAP, and device prescription, performed as described in the previous model, we proposed a new follow-up approach. Within four months since the beginning of CPAP domiciliary utilization, the previous pulmonologist's visit was replaced by a PT's visit. Each PT must have at least three years of experience in CPAP setup and delivery to OSAS patients; he also must be able to autonomously set up different ventilators, prepare circuit and interface, supply it to the patient, verify adherence and efficacy by using ventilator's software, educate patients for CPAP use and home management. Furthermore, PTs were specifically trained in the use of software for compiling visits reports and dedicated sheet forms.

The visit was managed by PTs, comprised the same actions performed by the pulmonologist and were structured through the use of a shared decision-making algorithm (Figure 1). The decision-making algorithm focused on: 1. promoting an additional PT visit if a mask change was needed; 2. activating an urgent pulmonologist's visit if non-adherence, ineffectiveness, OSAS symptoms, or clinical problems were found; 3. anticipating the pulmonologist's control visit within 3-4 months in the presence of dubious symptoms or evaluations; 4. performing an educational reinforcement to CPAP usage, humidification, mask positioning by PT in case of management problems.

In the case of CPAP efficacy, good patient comfort, and no problems encountered, this PT-F model planned for a subsequent annual visit. In case of clinical doubts, a consultant pulmonologist was available by phone call to solve urgent requests. Patients did not follow this standard follow-up were excluded and PT's adherence visit was not intended as an alternative to the medical follow-up for chronic diseases.

Tele-titration with PT-oriented follow-up (TT-PT-F)

During the COVID-19 pandemic titrations to CPAP were temporarily suspended. As soon as it had been possible to resume clinical activity, the provision of CPAP was accompanied by a further modification of the follow-up model with the addition of telemonitoring, to reduce the number of direct accesses to the hospital and to limit any contact between patients and operators or between patients themselves. In this last model (TT-PT-F), titration and patient education were carried out in the same way and by the same professionals as in the previous model, but CPAP was provided to the patient at the time of initial titration to be managed at home, and CPAP usage and efficacy data were monitored remotely through dedicated web-cloud monitoring systems (Airview,

Care Orchestrator, and others). The first titration session was conducted in the hospital by a PT and a physician. The PT chose the mask and performed an initial education on CPAP use. Thereafter, the patient took the device home and began the treatment. A visit from a home-care provider was scheduled on the first day of auto CPAP use. The AutoCPAP was employed for about 4-6 days and the pressure registered was used as the target to define the fixed CPAP pressure. The switch from autoCPAP to fixed CPAP was performed via a web platform (Airview, Resmed) directly by the PT, with the pulmonologist as consultant. The setting of fixed CPAP corresponded to 95% of the pressure of AutoCPAP, according to previous studies (16,17). A daily phone contact between the patient and PT was performed to monitor and quickly resolve any problem with comfort, mask, and device. When needed, the patients could go to the hospital for planned PT re-evaluations (i.e. in case of mask or device problems), or a pulmonologist's visit (i.e., in case of insufficient compliance or doubt about clinical issues). A dedicated online platform was also developed for sharing data among all members of the care team, by using the corporate version of Microsoft Teams (Microsoft, Redmond, US). In the absence of problems, the patient continued the treatment at home for at least ten days and re-entered the hospital for the conclusion of the titration process, an occasion in which further education was carried out by the PT and reinforcement on the importance of using the device by the pulmonologist. Within four months from CPAP prescription, patients were addressed to PT's adherence visit. The PT conducted the visit as in the previous model, but usage and efficacy data could be accessed directly by the PT through the web cloud.

Table S1. Comparison between patients who attended and not attended the follow-up visit within 1 year since the CPAP prescription.

	Overall (n=163)	**Follow-up visit available within one year** (n=122)	**Lost at one year** (n=41)	**p***
Male, n (%)	117 (71.8)	86 (71.1)	31 (75.6)	0.53
Age, years	61.72 ± 11.87	61.9 ± 10.5	61.20 ± 15.32	0.74
BMI, kg/m²	31.53 ± 6.28	31.7 ± 6.5	30.52 ± 5.50	0.26
Before CPAP prescription				
AHI, events/hour	38.52 ± 23.46	39.7 ± 24.1	34.79 ± 21.24	0.25
Percentage of obstructive apnea, %	81.72 ± 18.95	81.7 ± 18.8	81.84 ± 17.35	0.97
ODI, events/hour	38.02 ± 23.90	38.8 ± 24.7	35.69 ± 21.74	0.48
Mean SpO_2, %	90.62 ± 8.07	90.4 ± 9.2	91.24 ± 2.80	0.58
T90, %	24.79 ± 27.81	23.9 ± 27.5	27.51 ± 29.11	0.48
ESS, score	7.60 ± 4.69	7.6 ± 4.9	7.47 ± 3.37	0.90
Mean CPAP pressure, cmH_2O	10.58 ± 2.44	10.7 ± 2.5	10.24 ± 2.28	0.30
Mask type available on, n (%)	*163 (100)*	122 (100) 3 (2.5)	41 (100) 3 (7.3)	**0.032**
Pillows	6 (3.7)	23 (18.9)	1 (2.4)	
Minimal contact	24 (14.7)	52 (42.6)	23 (56.1)	
Nasal	75 (46.0)	44 (36.0)	14 (34.1)	
Oronasal	58 (35.6)			
Duration of titration period, days	23.13 ± 25.59	24.0 ± 28.4	20.39 ± 13.66	0.45
Number of PT's visit during titration period, n	3.91 ± 2.48	3.8 ± 2.5	4.17 ± 2.39	0.43
Residual AHI in CPAP, events/hour	5.58 ± 5.67	6.07 ± 6.13	3.70 ± 3.07	**0.021**
Residual ODI in CPAP, events/hour	6.76 ± 7.31	6.2 ± 6.2	6.13 ± 5.94	0.53
Mean SpO_2 in CPAP, %	93.92 ± 2.05	93.9 ± 2.1	93.92 ± 1.92	>0.99
T90 in CPAP, %	4.85 ± 13.88	5.0 ± 15.2	4.34 ± 8.82	0.79

CPAP, continuous positive airway pressure; PT, physiotherapist; BMI, body mass index; AHI, apnea hypopnea index; ODI, oxygen desaturation index; T90, percentage of sleep time spent with arterial oxygen saturation (SaO_2) <90%; ESS, Epworth sleepiness scale.