# PIMA: Improving the quality of life of patients undergoing continuous positive airway pressure (CPAP) treatment with obstructive sleep apnea diagnosis

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## Introduction

Obstructive sleep apnea (OSA) is a debilitating disorder that can be symptomatic or not and is accompanied by major neurocognitive and cardiovascular sequelae. The Individualized Adherence Improvement Plan (Spanish acronym: PIMA) is a PROACTIVE plan aimed at self-caring, responsibility and improvement of patients' quality of life. PIMA's objectives are to improve adherence and compliance to CPAP treatment, improve outcomes that matter to patients (mood, activities, socials relations) and quality of life, improve care activity and promote sustainability of the healthcare system. Motivational interviews drive the key methodology. Four actions are fundamental in its development: an educational and formative program based on scientific evidence, a patient stratification, a follow-up with a specific questionnaire with psychometric validation developed by Air Liquide and an individualized/adapted care plan for each patient. PIMA is a patient-centered and value-based approach program that individualize the treatment according to specific patient's needs, improving adherence of CPAP treatment in order to enhance patients' outcomes such as sleepiness, mood, activities and social relationships. The Spanish association of sleep apnea patients (ASENARCO) collaborated on the patient outcomes identification phase. The aim is to present the results obtained at the Hospital Universitario Central of Asturias- HUCA (Spain).

## Method

One randomized control trial (RCT) (with Clinical Research Ethics Committee approval) was carried out in HUCA. The two groups (PIMA and Control) were made up of 42 patients, being equivalent in all socio-demographic and clinical variables at the start of the study. Follow-up for all patients in both groups was 6 months.

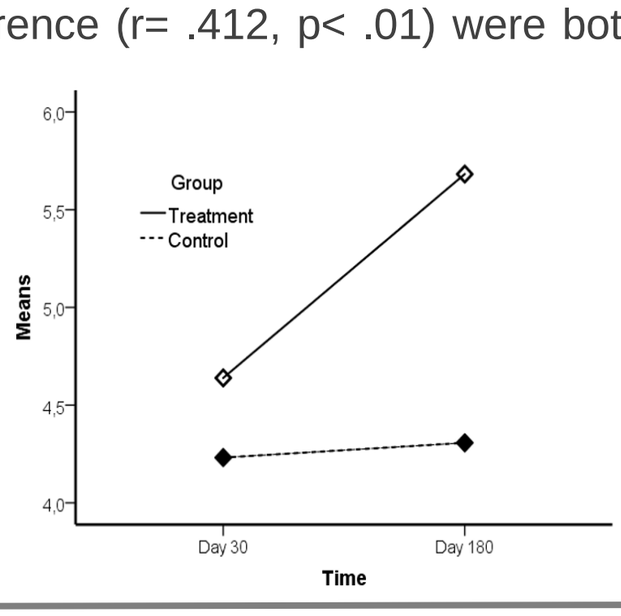
The control methodology is the one that establishes the standard treatment: face-to-face visits on the start day, at month and at month 6; There is no patient stratification or treatment differentiation. The PIMA methodology is as follows: Firstly, certain socio-demographic characteristics are taken (age, level of education, digital behaviour, accessibility). Then, a specific educational and training program called MEntA (Motivational Interview Adherence) is carried out. It allows the patient to better integrate the most elementary aspects for adherence: knowledge of OSA and habits, self-efficacy, and use. To support this, a questionnaire with psychometric validation has been developed and allows to know the level of self-efficacy by the patient in order to monitor the therapy. PIMA starts from a patient segmentation in order to initiate the best care plan that adapts both to their personal characteristics and to the situation related to the therapy. Each care plan has different monitoring channels (face-to-face, home visit, Air Liquide assistance corner, virtual, ...).Outcomes of the patients such as degree of sleepiness, mood, activities, social relationships, and overall QoL are measured during each follow up point.

## Results

There are a number of dependent variables of interest that have been measured in days 1, 30, 90 and 180. Mean differences have been studied among these time points in the patients that received the treatment. In order to better understand the treatment effect, days 30 and days 180 have been compared in the control group and no statistically significant differences found (Mean difference= 0.076, p> .05, *d*= .02), while there was a significant mean difference in the treatment group (Mean difference= 1.03, p< .05, *d*= .45). Additionally, we had measures of outcomes Epworth, compliance and QoL in day 180 for both treatment and control groups. The MANOVA was indeed significant (F(3, 77)= 3.007, p< .001, $\eta^2$ = .105). When continuation ANOVAs were performed, the statistically significant differences were located in the compliance variable (F(1, 79)= 6.99, p= .01, $\eta^2$= .081), with a larger mean for the treatment group (5.68) than for the control group (4.26). There were no significant differences between the means of Epworth (F(1, 79)= 1.88, p= .174, $\eta^2$ = .023) and Quality of Life (F(1, 79)= 1.42, p= .235, $\eta^2$ = .018). Of particular relevance are the relationships of Compliance with Quality of Life (r= .308, p< .01), mood (r= .234, p= .135), activities (r= .156, p= .323), social relations (r= .091, p= .241), adherence (r= .878, p< .01), and motivation (r= .513, p< .01). Additionally, the relationships of quality of life with Epworth (r= -.354, p< .01) and with adherence (r= .412, p< .01) were both statistically significant.

| Dependent Variable | F | *p* | $\eta^2$ | $M_1$ | $SD_1$ | $M_2$ | $SD_2$ | $M_3$ | $SD_3$ | $M_4$ | $SD_4$ | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Compliance | 208.39 | < .001 | .846 | - | - | 4.41 | 2.66 | 5.14 | 1.81 | 5.01 | 2.4 | 3.01 |
| Motivation | 6.338 | < .001 | .134 | 2.83 | 1.01 | 3.23 | 0.85 | 3.38 | 0.73 | 3.57 | 0.83 | 0.80 |
| Quality of Life | 25.57 | < .001 | .384 | 5.50 | 2.09 | 7.14 | 1.89 | 7.66 | 1.47 | 8.26 | 1.60 | 1.50 |
| Mood | 15.55 | < .001 | .275 | 1.09 | 0.65 | 1.59 | 0.66 | 1.71 | 0.50 | 1.78 | 0.51 | 1.19 |
| Activities | 17.61 | < .001 | .301 | 0.97 | 0.71 | 1.57 | 0.63 | 1.59 | 0.49 | 1.73 | 0.44 | 1.32 |
| Social relations | 15.97 | < .001 | .280 | 1.09 | 0.65 | 1.45 | 0.67 | 1.76 | 0.45 | 1.76 | 0.45 | 1.27 |
| Adherence | 9.437 | < .001 | .187 | 17.85 | 1.53 | 18.82 | 9.58 | 24.18 | 5.47 | 23.60 | 8.11 | 1.13 |

Notes: $\eta^2$=partial eta-squared, M= mean or median, SD=Standard Deviation, d= Cohen's d. Means and SD of Compliance are not calculated in time 1, because it is a constant.




## Conclusions

PIMA allowed to significantly improve (2 hours per day) treatment adherence and QoL compared to previous care pathway, becaming the standard treatment for all the patients in HUCA. PIMA works with physical and virtual visits adapted to individual patient needs with all the resources focused around the patient just like an IPU. This environment is composed of one psychologist specializing in communication skills and psychometric methodology, nurses and physiotherapists, hospital pulmonologists, and technical trained personnel able to deal with diverse incidents.