PHILIPS

DreamStation 2

Ramp Plus

Ramp Plus: Eliminate the guesswork and the need for later pressure changes

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Introduction

Obstructive sleep apnea (OSA) is a condition that has repeated episodes of partial or complete blockage of the airways during sleep. Symptoms of OSA include tiredness, excessive daytime sleepiness and morning headaches. The overall prevalence of OSA in the general adult population ranges from 9% to 38% with 13% to 33% in men and 6% to 19% in women, according to the Systemic Review.[1]

Continuous positive airway pressure (CPAP) is considered the gold standard of treatment for those suffering from OSA. Research has shown that compliance is variable with about 25% of the patients discontinuing therapy within the first year.[1] CPAP users usually make the decision to abandon therapy within the first 4 weeks of treatment.[2] Additionally, only 50% of patients use the device consistently for an average of 6 hours every night with the other 50% with periodic usage of a compliance of 3.5 hours per night.[3]

The efficacy of PAP therapy relies on the patient's ability to use the system for the duration of their sleep. In general, CPAP adherence has not been associated with age, sex, education level, economic status, personality, or the characteristics of the disease, including diagnosis of severity or frequency of symptoms.[4] Factors that decrease the use of the CPAP therapy are skin abrasions and ulcerations from the mask, air leaks, claustrophobia, nasal congestion and difficulty with exhalation. Increased adherence may be affected by choosing the most comfortable mask, close patient follow-up and CPAP units with more advanced technologies, such as an integrated ramp feature.[5]

CPAP comfort features for compliance

Comfort features like humidification, pressure relief upon exhalation and ramp have shown a benefit for enhancing PAP therapy adherence. They are widely available and should be utilized to improve comfort and tolerance whenever possible.[6] It has been shown that modification of the pressure via "Ramp" leads to an increase of CPAP usage by 13 minutes nightly.[7]

Ramp was developed to allow for a comfortable pressure delivery when initially falling asleep each night. Many PAP users have a difficult time acclimating to a higher therapeutic pressure at initial onset, therefore a ramp feature commonly started at a lower therapeutic pressure and gradually increased to have a smoother transition to sleep.

- Patient Adjustable Ramp is a linear progression of pressure that can be set in 5-minute increments between 0 and 45 minutes with a pressure range of 4 to the fixed CPAP prescription pressure
- SmartRamp utilizes and auto-titrating algorithm during the ramp period, which allows patients the ability to remain at lower pressures during the ramp period to improve their acclimation therapy. The device operates in auto mode, but if the patient falls asleep and the pressure has not yet reached the level to abolish the obstructions, the device will increase the pressure to resolve the events.
- Ramp Plus allows the patient to set and adjust the starting pressure for a set period of time (15, 30 or 45 minutes) where the pressure remains at the starting pressure during that set time. If the device detects an event during the ramp time, the pressure will increase similar to SmartRamp.

Ramp Plus

With the Auto CPAP mode, prescribed minimum (MIN) pressures often vary between 4 and 10 cm H_2O, indicating there is no set practice in setting pressure ranges. Additionally, approximately 25% of the time the initially prescribed MIN pressure is adjusted within the first 90 days of therapy.[8,9] The Ramp Plus feature in the DreamStation 2 CPAP device is designed to eliminate this guesswork of setting a unique MIN pressure by giving control of starting comfort to the patient to also help avoid the need to change the prescription later.

Without ramp some OSA patients may feel like the pressure being delivered is too high, while others may experience an uncomfortable breathing sensation when initiating therapy at the lower pressures. The discomfort, described as “air hunger”, is due to the lower starting pressure not delivering a large enough breath. Eighty-six percent of the time prescribed MIN pressures are increased after the initial setup.[9] Clinically, the new Ramp Plus feature has been designed to deliver a pressure that is comfortable for the patient and address the unpleasant feeling while attempting to fall asleep on therapy.

With Ramp Plus, the starting pressure can be set to Off or between 4 and 10 cm H_2O with a starting pressure time set for either 15, 30 or 45 minutes. During this set time, the air pressure remains constant at the chosen starting pressure unless the device detects an obstructive event, and similar to Smart Ramp, identifies the need to gradually increase the pressure. At the onset, the starting pressure can be set higher than the prescribed CPAP but will lower once the time has concluded.

Philips’ validated Auto CPAP algorithm has demonstrated effective treatment for the OSA patient with MIN pressures set to 4 cm H_2O and MAX pressures set to 20 cm H_2O. The auto algorithm combined with the expanded pressure range of the Ramp Plus feature offers the ability to prescribe an Auto CPAP (4 to 20 cm H_2O) and potentially avoid the inefficiencies associated with setting and later adjusting the MIN pressure.

Philips DreamStation 2 features Ramp Plus with the following notable features:

- Starting Ramp Plus pressure can be set to Off or between 4 and 10 cm H_2O.
- The set Ramp Plus pressure is constantly being delivered while utilizing the auto-titrating algorithm during the ramp period to increase pressure as needed.
- A starting Ramp Plus pressure above the prescribed fixed CPAP level and/or minimum auto CPAP control can be selected, but never above 10 cm H_2O. Starting Ramp Plus pressure can be set for either 15, 30 or 45 minutes. Once set, the Ramp Plus pressure will automatically be delivered when therapy starts without having to reinitiate.

In summary, CPAP users may be abandoning their therapy due to prescribed starting pressures that are too high and have a possible need to start and stay at lower pressures when falling asleep. In other instances, the OSA sufferer may need to start at a higher pressure to avoid the sensation of air hunger. Ramp Plus offers the flexibility in allowing the patient to pick a comfortable starting pressure regardless of the initially prescribed minimum pressure.

1. De Zeeux, J. et al, Loss of control belief is a predictor of CPAP compliance in patients with Obstructive Sleep Apnea Syndrome, Pneumologie, 2007; 61; 283-290. **2.** Zuzula, R., et al, Compliance with Continuous Positive Airway Pressure: Assessing and Improving Treatment Outcomes, Curr Opin Pulm Med, 2001, 7: 391-398. **3.** McArdle N, Devereaux G, Heidamejad, H, et al, Long-term use of CPAP therapy for sleep apnea/hypopnea syndrome, AJRCCM, 1999, 159:1108 -1114. **4.** Grunstein, R. Continuous positive airway pressure treatment for obstructive sleep apnea=hypopnea syndrome. In: Kryger, MH, Roth, T. Dement, WC, editors. Principles and practice of sleep medicine, 4th edition, Philadelphia, Elsevier; 2005; 1066-1080. **5.** Berry, RB. Improving CPAP compliance: man more that machine, Sleep Med 2000; 1(3):175-178. **6.** Wickwire, Emerson M et al, Maximizing Positive Airway Pressure Adherence in Adults, Chest, 144/2/August 2013. **7.** Kennedy, B. et al, Pressure modification or humidification for improving usage of CPAP machine in adults with obstructive sleep apnea, Cochrane Database System Review, 2019; 12:edoc3531 **8.** 2020 Analysis of 3006 French Care Orchestra patients **9.** 2020 Analysis of 41,703 US Care Orchestra patients **10.** Gagnadoux, Frederic et al, JCSM, Vol 13, No. 2, 2017

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Caution: U.S. federal law restricts these devices to sale by or on the order of a physician.

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