



Enhancing Sleep Quality in Chronic Respiratory Conditions: The Impact of the Nightingale Program



EXECUTIVE SUMMARY:

Asthma and Chronic Obstructive Pulmonary Disease (COPD) represent two of the most common respiratory diseases, and these conditions often result in poor sleep quality due to symptoms like coughing, wheezing, and breathlessness during the night. Together, over 40 million Americans suffer from asthma or COPD. Nightingale Virtual Respiratory Care by Health Care Originals (HCO) presents an innovative solution with the ADAMM-RSM device, a wearable for extensive respiratory monitoring, ensuring timely intervention. Within six months of the program, a substantial improvement in sleep quality was noted, with continued efficacy at the one-year mark.

Despite brief declines, the sustained enhancement in sleep quality solidifies Nightingale's effectiveness in managing chronic respiratory diseases. Nightingale not only substantially elevates sleep quality and health outcomes in those suffering from Asthma and COPD but it also boosts the overall quality of life for such individuals.

INTRODUCTION:

Asthma and COPD are the most prevalent respiratory diseases worldwide, characterized by symptoms like coughing, wheezing, and breathing difficulties. These symptoms can be severely disruptive, leading to a significant decrease in quality of life (QoL), and are often accompanied by clinical exacerbations, demanding additional therapy (Fabbri et al., 2017). One significant area impacted by these respiratory diseases is sleep. Nightingale Virtual Respiratory Care by HCO serves as a compelling solution to these issues and has shown significant promise in enhancing sleep quality for individuals grappling with these chronic respiratory diseases.

PROBLEM DESCRIPTION:

Clinical exacerbations, or acute flare-ups from asthma or COPD, pose a significant disturbance, often escalating to emergency situations and substantially diminishing QoL. With about

40%

of adult asthma patients and over 50% of children reporting at least one asthma attack in the prior year (Asthma and Allergy Foundation of America, 2023), the prevalence and impact of these exacerbations are undeniably extensive. For COPD sufferers, the situation is similarly grim, with roughly 20% experiencing nearly three exacerbations annually (Donaldson & Wedzicha, 2006). These exacerbations, particularly those occurring at night, lead to significant sleep disruption. The abrupt onset of symptoms such as difficulty breathing, coughing, and wheezing, can awaken individuals, drastically reducing their sleep quality and overall rest. This interrupted sleep pattern worsens the individual's health condition and contributes to increased fatigue and decreased productivity in daily activities, further degrading the QoL. Such disturbances contribute not only to health decline but also to diminished daytime functioning and productivity.

A recent study from Spain highlighted the pronounced impact of asthma and COPD on productivity (Dierick et al., 2021). Among a cohort of 14,383 individuals, a notable increase in work absence was recorded for those with respiratory conditions compared to the general population. Such absence, markedly higher for COPD sufferers, further highlights the need for effective management strategies, such as Nightingale Virtual Respiratory Care, supported by validated assessments such as the COPD and Asthma Sleep Impact Scale (CASIS). This comprehensive approach aids in enhancing not only sleep quality and health outcomes but also in significantly boosting work productivity and overall quality of life for those battling these chronic respiratory conditions.

SOLUTION DESCRIPTION:

Nightingale Virtual Respiratory Care enhances chronic respiratory condition management, emphasizing the importance of relationships with healthcare professionals alongside technological assistance. This balanced approach boosts patient engagement, leading to sustained, positive outcomes.

ADAMM-RSM Device: A Cornerstone of Nightingale

Along with virtual respiratory therapy and a condition management app, Nightingale highlights the ADAMM-RSM device, a compact wearable providing extensive respiratory monitoring. It records diverse cough metrics and identifies chronic cough, which is crucial for managing asthma and COPD (Calverley, 2013). The device's "bedside" mode ensures continuous health tracking, even when the device is not being worn, alerting wearers and contacts of any deviation from baseline auscultations, warranting immediate attention.

ADAMM-RSM's light, discreet design facilitates ease of use, ranking highest in forecasting, and appearance for predicting COPD exacerbations (Fan et al., 2020). The device's dual-modality remote monitoring and real-time telemedicine telemetry enhance patient-therapist communication. Its edge-computing foundation allows extensive data storage, transmitting data only in the presence of a recognized internet source, aiding those in areas with limited connectivity (Rhee et al., 2015).



Nightingale Program: Elevating Self-Management

Beyond the ADAMM-RSM device, Nightingale's three-pronged approach – comprising a simple digital interface, extensive monitoring device, and human interaction – solidifies its commitment to superior self-management for asthma and COPD patients. The patient-friendly app dashboard concentrates on essential parameters like cough frequency and heart rate, allowing patients to create medication reminders, identify symptom triggers, and evaluate their self-management.

Building Trust and Customization

From the start, the Nightingale Program establishes trusted relationships, with respiratory therapists engaging with patients. The program is tailored to accommodate various social determinants of health, ensuring optimal care delivery even in regions with poor air quality and limited internet access. This approach, alongside the advanced capabilities of the ADAMM-RSM device, culminates in an innovative, comprehensive solution for managing chronic respiratory conditions and thus improving sleep quality.



RESULTS:

Sleep quality is an issue of great importance for those with chronic respiratory conditions. Thus, using the clinically validated CASIS assessment, HCO monitored patient-reported sleep outcomes for Nightingale users upon enrollment (baseline) and at three-, six-, nine-, and 12months following enrollment.

The sleep problem parameters from CASIS are presented in Figure 1, with green, yellow, and red bars depicting sleep problems as "never/rarely," "sometimes," or "often/very often," respectively. While roughly a quarter of individuals reported having "a bad night's sleep" often or very often at baseline, only 15% reported this at three months, and **by six months, 0% of members reported having a bad night's sleep often or very often.**

In fact, six months after enrolling in the Nightingale program, 62% of individuals indicated they "never or rarely" had a bad night's sleep (Figure 1a). After three months, none (0%) of the respondents reported waking up at night with breathing problems, having problems staying awake during the day, or having trouble falling asleep (Figure 1b-d). Importantly, by 12 months, a mere minority of respondents enrolled in the program reported having sleep problems (as measured by CASIS) "often" or "very often," and in most cases, a majority of respondents reported "never" or "rarely" having sleep problems 12-months following enrollment (Figure 1a-e).

It is worth noting that there was an increase in the number of respondents experiencing sleep problems nine months following enrollment.



Figure 1. Frequency of sleep problems at different times for those enrolled in Nightingale (data from CASIS).

This patient-reported decline in sleep quality (compared to three and six-month measurements) aligned with the slight decline in outcomes observed in the SGRQ data, which further reinforces the idea that another factor, such as the time of year at which most participants completed the nine-month survey, may be affecting the results.

Overall, these results demonstrate that the majority of responding members experienced a decline in sleep problems following enrollment in HCO's Nightingale Program.

The CASIS measures asking about the frequency of good, or quality, sleep also reflected improvements following enrollment with Nightingale (Figure 2a and b). At the time of enrollment, 30% and 38% reported "never" or "rarely" having "a good night's sleep" or waking up "feeling rested," respectively. However, three and six-months following enrollment, only 15% and 8% of respondents in the Nightingale Program reported "never" or "rarely" having a good night's sleep, a great reduction compared to baseline.

Similarly, after three and six- months of using Nightingale, only 8% of respondents reported "never" or "rarely" waking up feeling rested, suggesting that sleep quality improved within months following enrollment.

Eighty-five percent of program respondents indicated having a good night's sleep "often" or "very often" six months following enrollment, while 69% reported waking up feeling rested "often" or "very often" at this same time (Figure 2).



DISCUSSION:

It is clear from the patient-reported results presented that individuals using Nightingale experienced improved sleep quality. Respondents indicated sleep problems (and reduced quality of sleep) at nine months. There are several possible reasons for these observations. For example, HCO noted that most (86%) of the nine-month patientreported data was obtained between January and March and the remainder was submitted during April. It is during this time of year (winter and spring) that viruses, other maladies, and allergies tend to be more prevalent due to seasonal and environmental impacts. Several individuals in the program were particularly ill during that timeframe, with some individuals reporting symptoms scores over 75 on the SGRQ assessment (email correspondence with Sharon Samjitsingh, July 17, 2023), which may have skewed the data. Oftentimes, it is during the winter and spring that respiratory illness and related allergies can be particularly challenging.

Nonetheless, other reasons may exist for data changes after nine months of program engagement. For example, perhaps after experiencing clinical improvements during the first few months in the program, individuals became more complacent and less engaged around nine months, another possible reason for slightly less substantial improvement in sleep. If program or device fatigue played a role, perhaps the more favorable outcomes were again observed around 12 months, when individuals realized the value of the program and reinstated engagement practices.





Figure 2. Frequency of quality sleep at different times for those enrolled in Nightingale (as measured by CASIS).

"NIGHTINGALE SIGNIFICANTLY IMPROVES SLEEP QUALITY FOR INDIVIDUALS SUFFERING FROM ASTHMA AND COPD"

Regardless of the underlying reasons for a slight disruption in the clinical improvement trend, by 12 months, a majority of respondents reported robust improvements in sleep quality. These findings substantiate the idea that a seasonal factor could have been influencing the nine-month data.

CONCLUSION:

Nightingale Virtual Respiratory Care by Health Care Originals significantly improves sleep quality for individuals suffering from Asthma and COPD, as backed by continuous patient monitoring and the innovative ADAMM-RSM device. Within six months of the program, remarkable enhancement in sleep quality is reported, with sustained improvements at the one-year mark despite a brief decline at nine months, potentially due to seasonal factors. This comprehensive program proves successful in managing chronic respiratory conditions, resulting in elevated sleep quality, and overall enhanced quality of life and work productivity, substantiating its effectiveness and importance in chronic respiratory disease management.



SOURCES

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