

# Closing the Care Gap with Connected Health Solutions



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# Remote monitoring and app-based support improve adherence to obstructive sleep apnea treatment, speed resolution of problems, and reduce the care management burdens on clinicians, say prescribing physicians, patients, and researchers.

By Lena Kauffman

**C**PAP users often do not know why they sometimes feel exhausted and sometimes feel great after a night using their device. Little things can throw off sleep, some of which are device related, like a mask leak, and some of which are not. Michael Fleming, MD, a retired family medicine physician who was diagnosed with obstructive sleep apnea and started CPAP [continuous positive airway pressure] therapy six years ago, found this extremely frustrating.

“I knew something was wrong but I couldn’t validate it because I had no way of checking it,” he says.

Fleming went through a couple of different devices and a lot of trial and error before he was prescribed a ResMed device three years ago that came with something brand new—a patient-friendly remote monitoring tool called myAir. Introduced in 2014, myAir, which Fleming uses on his computer but can also be used on smart phones and tablets, provides automated feedback on how the ResMed device is functioning, helps troubleshoot issues, and offers coaching and encouragement based on research-backed motivational techniques. Most importantly for Fleming, it lets him start to draw connections between what the device is telling him and how he is feeling each day.



ResMed's Air10 sleep-disordered breathing devices are compatible with the patient-friendly myAir platform.

Vic,\* another longtime CPAP user, had a similar experience being frustrated by a lack of useful information on his sleep, even from later generation devices with small LED screens that gave some next-day feedback. Using the myAir app on his smart phone has given him back a feeling of control over his health.

“The visibility of my sleep trends is priceless to me,” he says. “In prior devices where I didn’t have this data, I would have days where I would feel bad and I would never really know why. Did I stay up too late last night or was it a bad night on the CPAP or did I not get enough hydration the day before? That unknown factor for me was frustrating.”

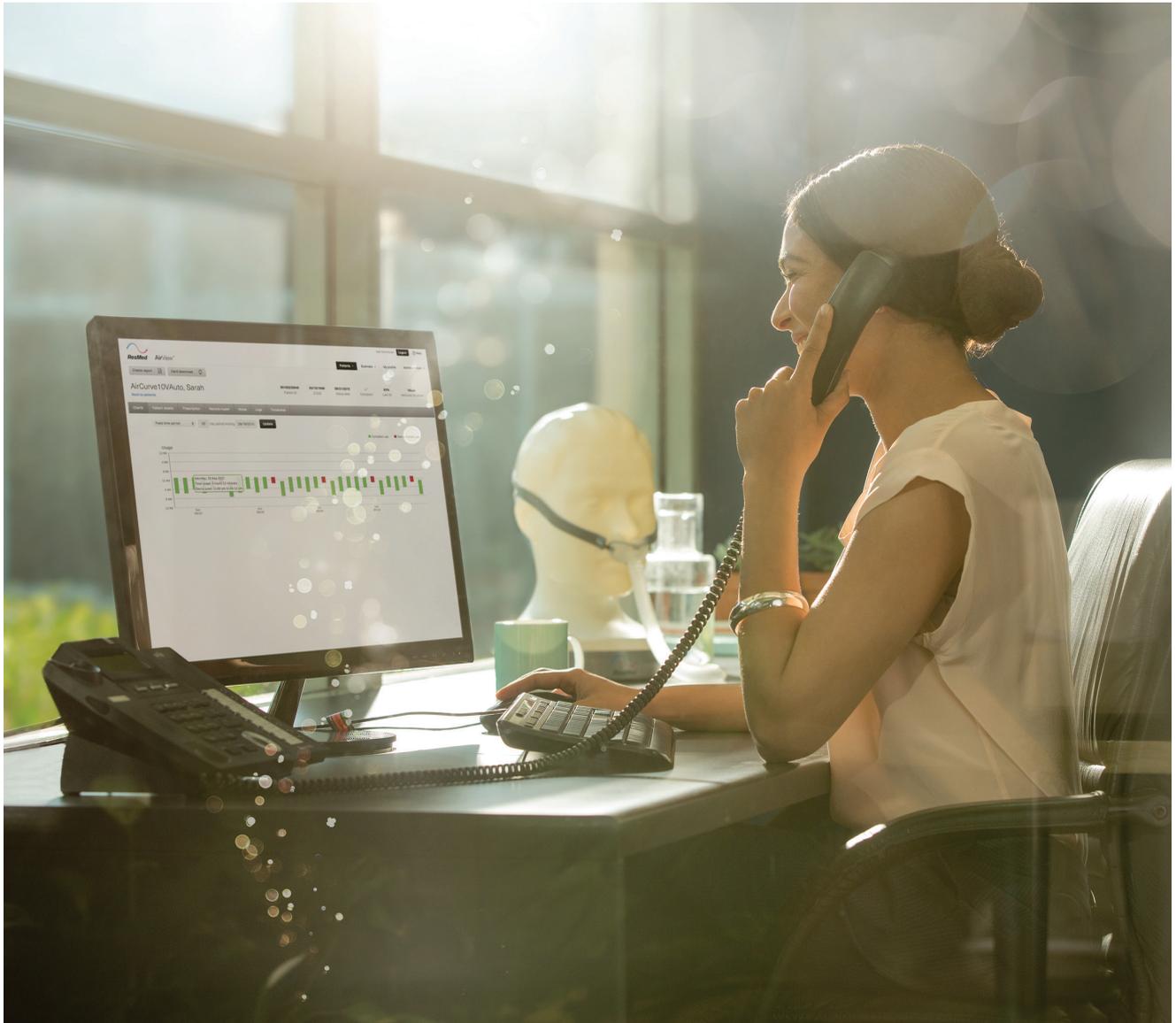
## AUTOMATION OPENS NEW DOORS

Sleep physicians have understood for well over a decade that patients like Fleming and Vic do better if they receive more feedback, troubleshooting tips, and support from their care providers, especially in the frequently frustrating early stages of PAP adoption when problems often crop up and the patient had yet to feel real benefits from the therapy. However, until recently, providing this type of support was very labor intensive. It was simply not feasible for providers to call patients daily, walk with them every step of the way toward becoming compliant with their treatment, and continue this follow-up indefinitely. What is changing the game is the evolution of telemonitoring with telemedicine follow-up.

ResMed AirSense 10 and AirCurve 10 (Air10) sleep-disordered breathing therapy devices are built to wirelessly and securely transmit usage and therapy data. Sleep physicians can then monitor their patients’ use of their devices and compliance with treatment through a cloud-based platform called AirView. The myAir app is an optional tool that patients who use Air10 devices can download so they too can see some of the data their physicians see and get automated coaching and support based on what the device is reporting.

AirView and myAir are leading products in the shift toward automated disease management using remote monitoring tools. According to the eighth edition of the *mHealth and*

\*Last name withheld at patient’s request.



ResMed's AirView allows clinicians to adjust a patient's positive airway pressure device remotely.

*Home Monitoring* report by market research provider Berg Insight, the number of remotely monitored patients grew by 44% to 7.1 million in 2016 and these numbers are expected to reach 50.2 million by 2021.<sup>1</sup> While not all of these patients are sleep therapy device patients, a significant percentage are, as sleep therapy device monitoring (along with implantable cardiac rhythm management devices) is a key application of telemonitoring technology.

Haramandee Haramandee Singh, MD, DABPN, medical director of Tri-Valley Sleep Center in San Ramon, Calif, uses AirView in his practice and encourages patients to download the myAir app. He says the automated text and email messages to his patients, along with data on sleep trends, are letting

him provide a level of care he simply couldn't match before. Previously, Tri-Valley Sleep Center would ask the durable medical equipment providers (DMEs) they worked with to follow up with patients to ensure compliance, but about 80% of the DMEs simply couldn't do it. Even though it might put their reimbursement at risk and endanger their future referrals from Tri-Valley, the cost of having staff call and follow-up with patients was just too high. However, with treatment devices that can transmit data wirelessly to the AirView platform, Singh and his staff can do their own follow-up from the comfort of their desks.

In addition, AirView is able to "talk" back to the devices connected to it for true two-way communication. If Singh sees

a patient is having an issue or gets a call from a patient complaining that something doesn't feel right, he can log onto the secure AirView platform on his computer, review the device data, and make adjustments to the device's settings as needed without having to see the device or the patient in person to address the issue.

"We are saving time because I can change things like pressure settings remotely in less than 30 seconds," Singh says.

This is also a big help to his patients. In the past, patients had to make an appointment and frequently take time off work to bring in their device in person for adjustment. This both discouraged patients from reporting issues and delayed fixing problems, which in turn increased the odds that the patient would get fed up with the adjustment process and simply give up.

"If a patient is having issues within the first week of having CPAP, they are going to give it up and that is why we had such a high non-compliance rate in the past," Singh says.

He adds that now his patients have compliance rates of 90%, which was unheard of before. Plus, if patients do have issues that truly must be addressed in person, he is now more available to those patients.

Research backs Singh's personal experience. It shows that even though patients are receiving overall less in-person follow-up and more automated machine follow-up, the outcomes are not affected—and may even be better than staff follow-up because automated problem troubleshooting, coaching, and self-help are available any time day or night. A 2016 study in the journal *Sleep and Breathing* looked at 122 newly diagnosed obstructive sleep apnea (OSA) patients and compared the amount of work between patients who received scheduled follow-up calls after they started CPAP therapy and patients

who received automated text messages and/or emails to coach them on their new therapy. Not surprisingly, the automated messages were less work for the therapists than calling patients, but what was significant was that there was no meaningful difference in treatment adherence and patient outcomes between the two groups.<sup>2</sup>

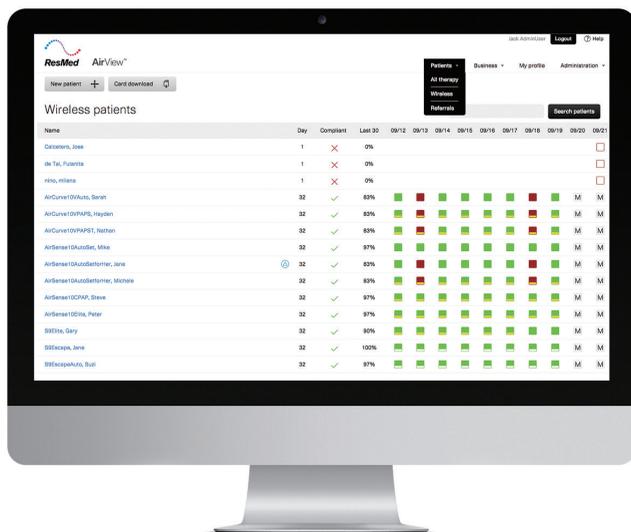
In addition, early and regular automated follow-up seems to help patients become compliant with therapy more quickly, which may be key to them sticking with their treatment as they come to realize positive impacts on their health more rapidly. A recent retrospective study on CPAP adherence found that a high proportion (83.9%) of brand new CPAP users who used standard care and the ResMed myAir self-management application achieved Medicare adherence in the first 90 days of CPAP treatment. The median time to achieve Medicare adherence was 23 days.<sup>3</sup>

## LOWER TOUCH, MORE CARE

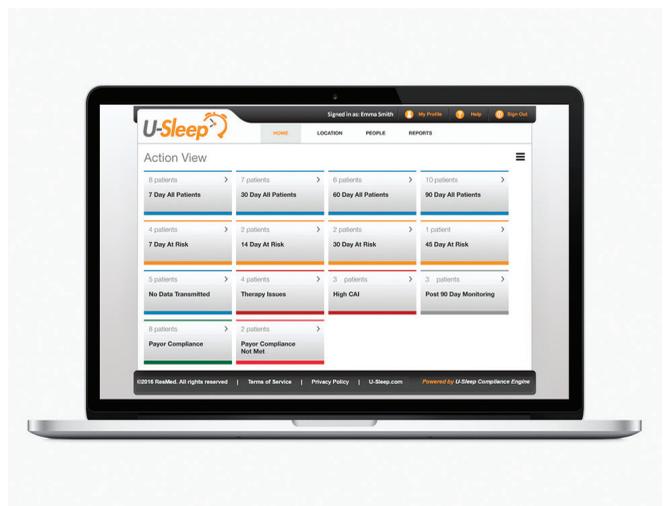
Dennis Hwang, MD, a pulmonary medicine physician at Kaiser Permanente Ontario Medical Center in Ontario, Calif, uses AirView along with the myAir app and an additional program called U-Sleep. U-Sleep is an automated sleep therapy management program that is compatible with AirView and myAir. Studying Kaiser patients that use PAP devices, he has found a 21% improvement in compliance when patients received the automated messages through U-Sleep and myAir, even though these patients were not getting any more human follow-up than the patients who were followed-up with in traditional ways like calling or coming in for appointments.<sup>4</sup>

"We believe it actually increases the quality of care because we are empowering patients," he says.

Low-touch automated follow-up doesn't necessarily mean

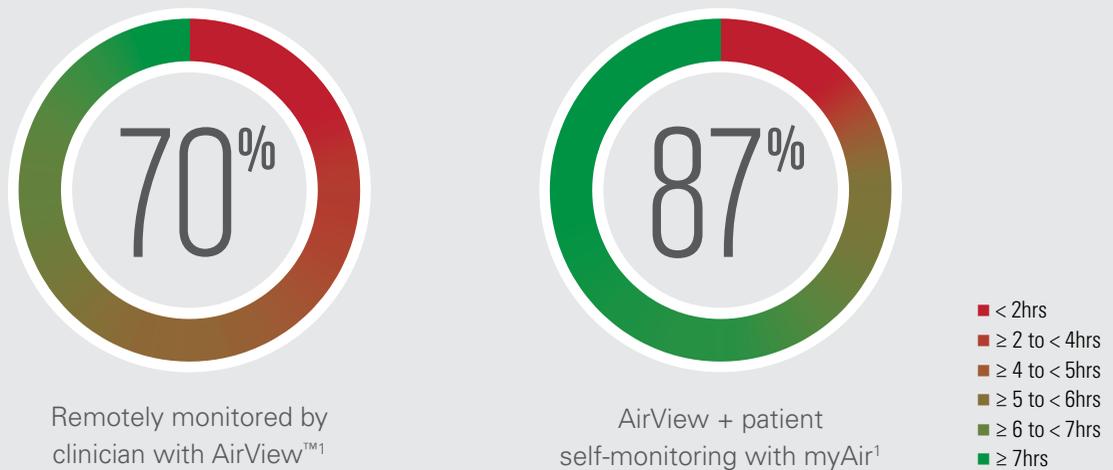


Using AirView, clinicians can conveniently view many therapy compliance details without a patient having to take time off work and bring their device in person.



ResMed's U-Sleep is an automated sleep therapy management program that is compatible with AirView and myAir.

## Percentage of patients who were compliant\* on CPAP:



\*CPAP compliance, as defined by the U.S. Center for Medicare & Medicaid Services, requires using CPAP 4 hours a night for 70% of nights in a 30-day span within the first 90 days of therapy. <sup>1</sup>Crocker M, Lunch S, Willes L, Kelly C, Benjafield A. A propensity-adjusted comparative analysis of PAP adherence associated with use of myAir. Original Investigation Poster. CHEST Annual Meeting 2016. Presented on 26 Oct 2016.

lower care, agrees James Mojica, MD, vice chief and clinical director of pulmonary at Massachusetts General Hospital and medical director of Pulmonary Associates Outpatient Practice. In Massachusetts, state law greatly curtails in-lab sleep studies and encourages home-based testing and telemonitoring. This has pushed his practice toward relying more on automated patient follow-up, and Mojica finds that this has actually created a closer relationship between the patients and the practice even though one might expect automation to do the opposite.

“One of the problems oftentimes is access to a doctor’s office and we would schedule follow-ups in a month, three months, six months, or a year, and oftentimes these problems can arise from one night to the next,”

Mojica says.

With myAir, patients are empowered to call him when there is a problem and he can see what is going on with the patient’s device with a high level of accuracy. For example, a patient recently called Mojica because he got a warning the mask was leaking and it turned out that he simply needed to call the DME and get a new mask. Another patient called while vacationing. It turned out that because the patient was in a high-altitude area, he had

developed a central sleep apnea, which Mojica saw when examining the AirView data from his Massachusetts office. Mojica adjusted the CPAP device settings remotely through AirView and the patient was able to go back to enjoying his vacation.

“It has really revolutionized our care...I can see their machine [data] and both of us are getting feedback on their performance,” Mojica says.

### SATISFYING PATIENT DEMAND FOR APP-BASED CARE

Having an app that is research-based is also helpful in meeting patient demands for more information about their sleep health on their mobile devices. There are dozens of apps available for downloading on Android or iOS devices and little government oversight of the health claims behind them.

Singh says he regularly has to educate patients about the limits of these non-research-backed apps, and while some can be useful, like apps that guide the user through relaxation techniques to help them go to sleep,

many are not. A research-backed app like myAir, which is also secure and compliant with Health Insurance Portability and

**We believe automated follow-up actually increases the quality of care because we are empowering patients.**

—Dennis Hwang, MD

Accountability Act privacy protections, lets him meet the expectations of his tech-savvy patients who live near San Francisco and Silicon Valley.

While not every patient wants this level of information on his or her personal health, there are a sizable number of patients who have become used to having health data at their fingertips with devices like FitBit and mobile apps, but do not always understand the differences between apps built by sleep and behavioral health experts and apps built with less scientific rigor.

In creating myAir's automated messages to patients, ResMed pulled together an international cross-disciplinary team of experts in the most common issues patients encounter (eg, mask fit and comfort), motivational interviewing techniques, and software development. The team integrated aspects of social cognitive theory, the Fogg Behavior Model, motivational interviewing techniques, and the Chronic Care Model. They also decided to break complex tasks and information into small

pieces that research shows people respond to more effectively and create positive messages for even small incremental improvement.

Amy Cook, director of Healthcare Informatics at ResMed, worked with the various teams that developed and refined the automated messages delivered to patients in response to the data the treatment devices are sending back to AirView.

"As a leader in developing treatment devices, we have spent a lot of time and a lot of years studying where the biggest pain points in treatment are for patients," Cook says. "We used that knowledge when developing the myAir app to zero in on the types of issues patients encounter most often."

Motivational interviewing techniques and coaching tips that linked out to videos that patients could view to learn how to adjust their own mask fit and troubleshoot problems featured prominently in their approach.

"If you can troubleshoot yourself and get to a positive outcome, you can build confidence and motivation to continue to keep trying," Cook says.

The myAir app sends three types of follow-up messages:

- Educational messages to help make therapy more comfortable and let the patient build confidence using the device.
- Praise messages that reinforce positive behavior when the device indicates specific measures for compliance with treatment are met.
- Encouragement messages when the device indicates the patient is perhaps struggling to stay compliant with therapy.

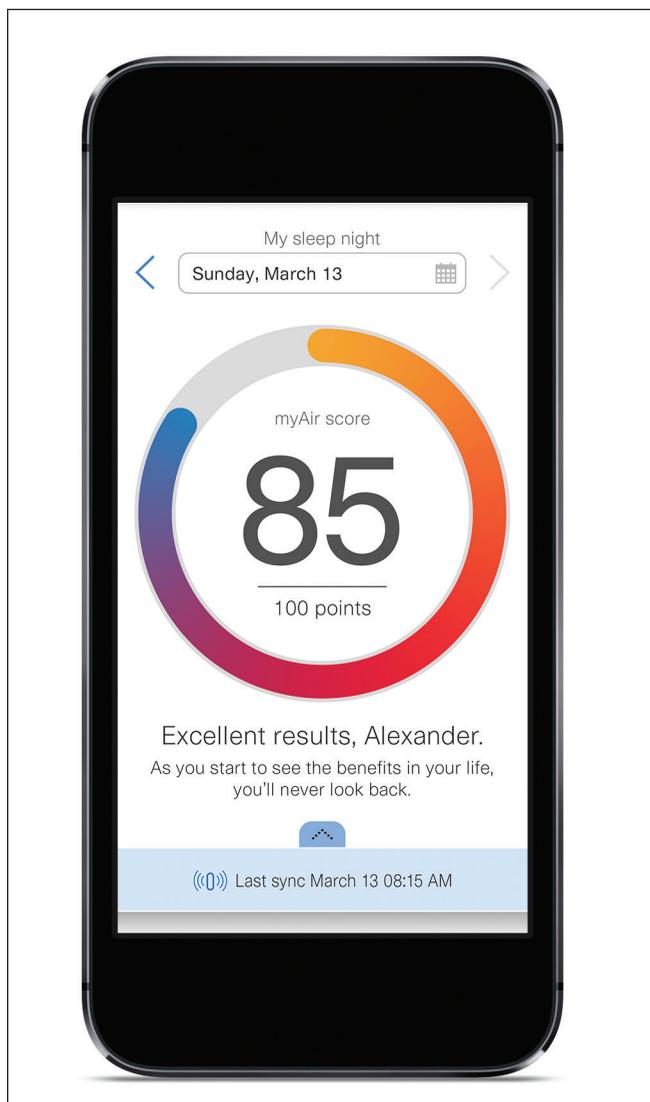
In addition, ResMed collects data on myAir and is continually refining and improving the coaching it delivers.

"You can't create a coaching program and be done forever," Cook says. "You have to continue to learn and evolve your coaching program for successful outcomes."

Research indicates that automated coaching is working. In an original investigation poster presented at CHEST 2016 in Los Angeles, researchers shared the results of a study that compared PAP device usage in over 128,000 patients who were managed with AirView and either used or didn't use the myAir app. The app users had an improvement in adherence of 17% over the patients who were in the AirView-only group. In addition, the myAir users were more likely to achieve adherence within the first 30 days of PAP therapy and their average daily PAP usage was a full hour longer. Furthermore, the myAir users were significantly more likely to use their PAP device for more than four hours per night.<sup>5</sup>

## MYAIR AS POPULATION HEALTH COMPONENT

Hwang is encouraged by these findings. Kaiser, where he practices, is both a health care provider and an insurer. That means the organization is 100% at risk if caring for their patient population ends up costing more than they had calculated when developing their insurance plan. However, they also stand to



In addition to being available from any web browser, myAir is available as a secure downloadable app for patients who own iPhones.

reap all the rewards if they can find cost-effective ways to bend the cost curve and deliver the same or better care outcomes for less money. Empowering patients to better manage their chronic conditions themselves is one way they hope to lower costs and get better results at the same time. Another way is through team-based care and technology. Kaiser is now one of the leading organizations in the move toward population health management through big data and automation of some care functions.

Hwang says his department simply would not be able to keep up without team-based care and use of the latest tools like AirView, U-Sleep, and myAir. It receives about 1,800 referrals a month, a volume of work that requires team-based care, technology, and empowering patients to handle some aspects of tracking their health and managing their care themselves.

“For us to be successful, it is very much focused on empowering the patient,” he says.

Kaiser is in the process of integrating data from U-Sleep into its electronic health record system where it will be linked with the patient’s sleep study results and full record of other conditions. The hope is that they can then use data analytics to advance a precision medicine approach to caring for these patients, learning for example which patients are going to benefit from a different mask and which need to try a dental appliance without all of the current trial and error involved in sleep-disordered breathing treatment that often frustrates patients.

In addition, they are moving toward what Hwang calls “continuous and forever follow-up” for sleep patients, which is something only made possible by technology like AirView that allows the patient to be part of his or her own care team.

“In this world of big data you just have way too many data points to manually review and use to create strategies to intervene when the data is not looking so good,” Hwang says.

Automated monitoring of the patient data and follow-up through software like AirView is the only way to leverage all of this information into actually improving patient care, according to Hwang, and patients may be more welcoming of this move than many physicians may expect as medicine becomes more consumer driven.

Fleming, for one, is a big fan of letting patients play a bigger role in their disease management as long as the tools they are using are research-backed and proven to be helpful.

## Devices Compatible with AirView, myAir, and U-Sleep

### ResMed AirSense 10 CPAP series

- AirSense 10 CPAP
- AirSense 10 AutoSet
- AirSense 10 Autoset for Her
- AirSense 10 Elite

### ResMed AirCurve 10 Bilevel series

- AirCurve 10 ASV
- AirCurve 10 VAuto
- AirCurve 10 S
- AirCurve 10 ST
- AirCurve 10 ST-A

## How to Set Up AirView and myAir

If you have patients using Air10 devices, signing up for AirView is simple. Register for your free AirView account at [www.rmdassets.com/airview/network\\_form](http://www.rmdassets.com/airview/network_form).

To get patients on Air10 devices set up on myAir, direct them to <https://myair.resmed.com>, where they can sign up for their free account. Patients will be asked to input some basic information, then can get started right away. Patients can also download the free app from the Apple App Store.

“As a patient, if there is something that I can take control of and manage myself, and if it is validated from an outside source, such as my physician, that it is going to help me make my health better,” he says. “People want to be able to monitor themselves and know more about their health. I think consumer-directed care overall is going to grow tremendously over the next few years.” AirView with myAir is a prime example of how this can happen. **SR**

Lena Kauffman is a freelance writer and former Sleep Review editor based in Ann Arbor, Mich.

AirSense 10, AirCurve 10, myAir, AirView, and U-Sleep are all registered trademarks of ResMed.

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# Engaged patients are adherent patients

How do you give your patients the best chance at sticking with CPAP? Keeping them engaged is a good place to start. myAir uses a nightly sleep score and interactive coaching to help patients become active participants in their therapy. And with 84% of new patients using myAir achieving compliance in 90 days<sup>1</sup>, the results speak for themselves. myAir is free and doesn't require technology pairing or complicated setup. It's available to ResMed Air10™ device users.

