

# Experts Discuss Phrenic Nerve Stimulation for Patients with Central Sleep Apnea

By UCHHealth North

Cindy Crosby, Rebecca Hood and Jessica Peach are respectively, the director, manager and supervisor of Sleep Services in University of Colorado Health's Northern Region. This includes their core labs at Poudre Valley Hospital and Medical Center of the Rockies and outreach or support services to surrounding areas. Their sleep team includes five board-certified sleep physicians and three sleep physician assistants as well as a large network of dedicated technologists and schedulers that allows their group to conduct over 6,000 sleep studies per year.

## How common is central sleep apnea (CSA) in your practice?

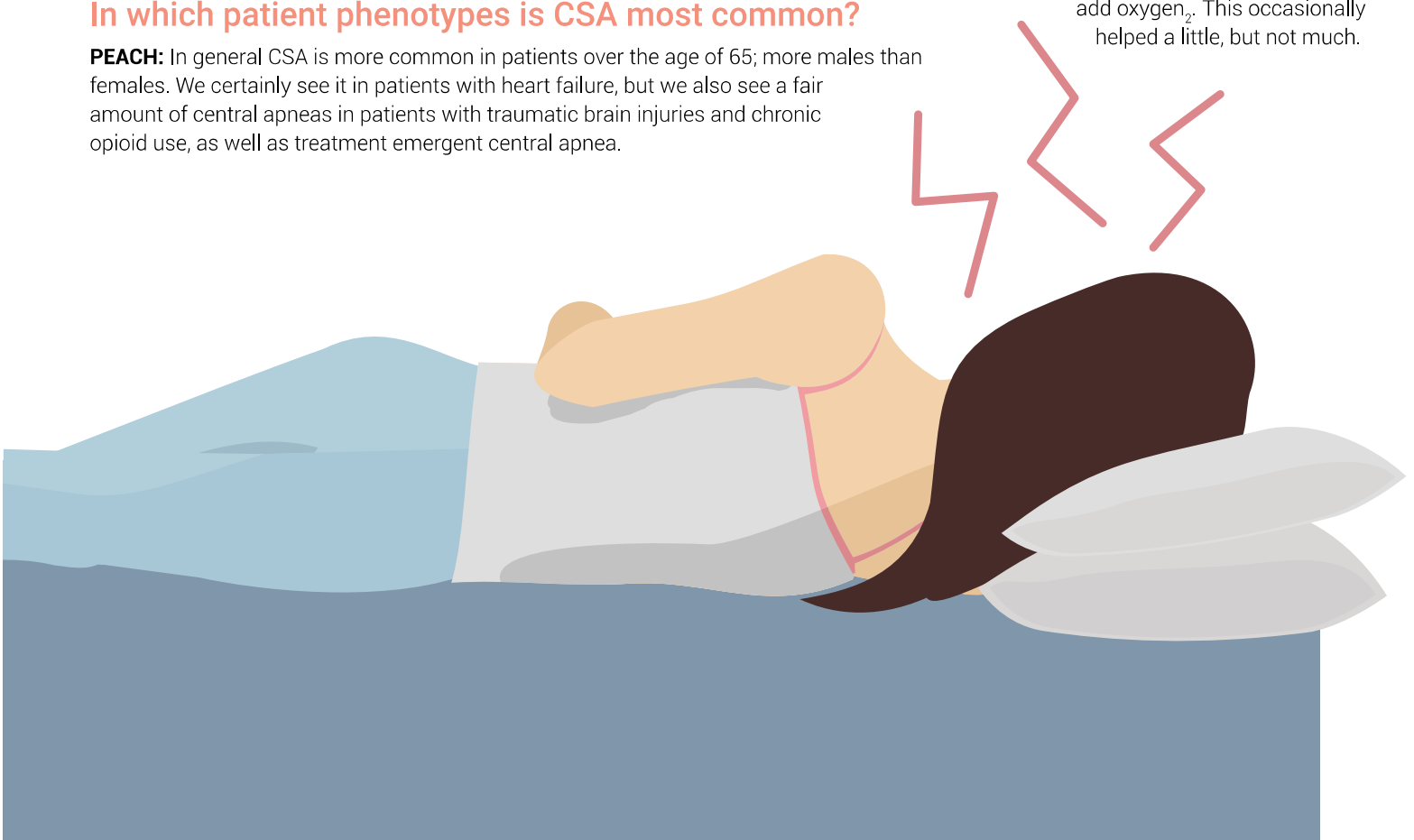
**CROSBY:** I'm hesitant to give an actual percentage, maybe 10%. It's far more common in Colorado at our altitude than in other parts of the country, and in our labs in the mountains, at even higher elevations, the prevalence percentage probably reaches as high as 25%. Our Respironics representatives told us that Dr. Mark Neagle, sleep medical director for Estes Park and our implant clinics, is the top prescribing MD for ASV in the country.

## In which patient phenotypes is CSA most common?

**PEACH:** In general CSA is more common in patients over the age of 65; more males than females. We certainly see it in patients with heart failure, but we also see a fair amount of central apneas in patients with traumatic brain injuries and chronic opioid use, as well as treatment emergent central apnea.

## What strategies have you used in the past when you see a patient with a high proportion of central events? What challenges did you face with these patients?

**HOOD:** As a night technologist 12 years ago, my heart always sank a bit when I saw those telltale flat tracings of central apneas. I thought "oh no, I'm not going to be able to help my patient." At the time CPAP very rarely helped, in fact, it often made it worse. All we could do was switch to bi-level therapy and add oxygen. This occasionally helped a little, but not much.



**CROSBY:** Twenty years ago, the standard many Denver labs used at that time was 10 cm and 2 Lof oxygen. It never seemed to do anything for the patient that night, but we were always told that it would work for the patient after a few weeks of being on it at home.

**HOOD:** Not too long after I started, new PAP, or ventilatory-support, algorithms (adaptive servo ventilation (ASV)) came out. The new technology worked often; however, we were not able to use ASV on all who might benefit from it due to strict insurance equipment-coverage criteria (central events had to account for greater than 50% of all events combined). Further limitations came a few years later when the Serve-HF study showed increased mortality rates in certain heart failure patient populations who also used this category of equipment.

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### When and why did you introduce phrenic nerve stimulation to your practice?

**PEACH:** As to the "why," like Rebecca said, there were still some significant gaps in terms of being able to help all patients experiencing CSA. What about those for whom ASV didn't work? What about the patients who didn't meet all the criteria?

**HOOD:** If for example their central apnea index was "only" 45%, were we supposed to be OK with treating just 55% of their apnea? Or what if they did qualify, but simply couldn't tolerate the treatment? And then there was the contraindication for heart failure patients with a left ventricular ejection fraction of less than 45%.

I want to give credit to Amy O'Brien, our first sleep technologist to read about and mention remedē to me. We had been fortunate to be part of a sleep lab and healthcare system that had been offering Inspire (implant used to treat obstructive sleep apnea) for three years so the concept wasn't entirely unfamiliar to me, yet, how would an implant work for central apnea?

**CROSBY:** In mid-2018, Dr. Mark Neagle reached out to remedē and Dr. Rob Kiser, electrophysiologist who now performs the remedē implants, to see if we could become an implanting center. Our first implant was on March 11, 2019, the 16th commercial implant done in the U.S. Since then, 10 more patients have been implanted.

### What is your initial patient experience with phrenic nerve stimulation?

**ALL:** We've seen the before and after studies. It's working really well. All patients would recommend it to a loved one and are feeling the benefits of the therapy. To us in the sleep world, implants aren't as common practice as they are in the cardiology domain. We are on the frontier of that change in sleep medicine.

### How does the programming and titration of the phrenic nerve stimulation device compare to other therapies?

**CROSBY:** It's amazing to see the patient's first intake of air as a result of the stimulus to the diaphragm. The information we get from the device itself also helps to fine tune if more or less stimulation is needed.

**HOOD:** And that it turns on by itself when the patient is in sleeping position ensures continual use and benefit to the patient.

### How has phrenic nerve stimulation changed how you evaluate and treat patients?

**HOOD:** I think Dr. Neagle would say, and we would all agree, that he truly wanted a way to help patients that ASV became contraindicated for.

**PEACH:** What surprised us in the sleep lab was when our heart failure physicians indicated that having an option other than CPAP to treat CSA patients would help them convince their patients to have a sleep study.

**CROSBY/PEACH:** It really has us paying more attention to whether a hypopnea is central or obstructive in nature.

### Anything you want to add?

**ALL:** Just how proud we are to work for our innovative health system and for Dr. Neagle and our sleep team. Also, how grateful we are to have remedē fill a very needed niche for our patients with central sleep apnea. 🌙



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