Fine-tuning Diagnosis and Management of EDS in Patients with Narcolepsy and OSA

Diagnosis and Treatment of Pediatric Narcolepsy with Cataplexy

CMEO Podcast Transcript

Richard Bogan:

Hello, I'm Richard Bogan. And on behalf of CME Outfitters, I would like to welcome and thank you for joining us for episode four of a four-part CMEOCast series, *Fine Tuning Diagnosis and Management of EDS in Patients with Narcolepsy and Obstructive Sleep Apnea*. Today's episode will address the "*Diagnosis and Treatment of Pediatric Narcolepsy with Cataplexy*." This activity is brought to you by CME Outfitters, an award-winning accredited provider of continuing education for clinicians worldwide. Again, I'm Richard Bogan, President of Bogan Sleep Consultants, LLC, Medical Officer at Sleep Med Incorporated, and Director of Sleep Med of South Carolina. I am also the Associate Clinical Professor at the University of South Carolina here in Columbia, South Carolina, and Associate Clinical Professor at the Medical University of South Carolina in Charleston, South Carolina.

I'm very pleased actually to be joined today by Dr. Michael Strunc. I call him Mike. He's Division Director of Child Neurology and Sleep at Children's Hospital of the King's Daughters and President of the Virginia Academy of Sleep Medicine. He is also Assistant Professor of Pediatrics at Eastern Virginia Medical School in Norfolk, Virginia. Welcome, Michael.

Michael Strunc:

Good to see you, Rick.

Richard Bogan:

So, to frame today's episode, let's start reviewing our learning objective, which is to integrate long-term safety and efficacy data into the treatment planning of pediatric narcolepsy with cataplexy. So, Michael, there are a lot of sleepy people out there, and sleep is discretionary and we have state stability. The brain loves to be awake when it wants to be awake and sleep when it wants to sleep. And many people are impaired and they don't really know it. So, let's began with a clinical presentation of narcolepsy and then begin to explore the nuances of the pediatric population and have difficulties to diagnose.

Michael Strunc:

Sounds good. Well, I guess I agree with you. I think that we have sort of a sleepy population. And I saw one article, probably a year ago that was, I think, in national geographic. And they said we're currently undergoing a long-term clinical trial of sleep deprivation in the American population. So, I think it's sort of almost an American thing that we work hard and try to do better, but as a result, sleep deprivation and sleepy people seems like a very common state for a lot of our families, our friends or colleagues. So, it is sort of trying to figure out when sleepiness is actually pathologic, and in narcolepsy, which is not a rare disorder if we think about it, one in every couple of 1000 people, that it's actually more common than we might think.

And I guess, the way I think of narcolepsy as a disorder for our patients and particularly in pediatric patients, is that despite an adequate amount of sleep or an adequate time for sleep, these are patients who have this incessant sleepiness. It's sort of a pervasiveness that is there, that is not due to insufficient sleep, it's not due to sleep apnea, it's not just sort of bad habits. And then, it's accompanied by a lot of unusual things that may or may not really be even that apparent to our patients. Would you agree?

Richard Bogan:

No, I completely agree. I think the REM dissociative symptoms, because in narcolepsy, I think of state instability so neither awake nor asleep are stable. So these individuals are sleepy. They doze off when they're not stimulated. And then, sometimes they don't know how sleepy they are because when they're stimulated, they can stay awake, but when they're not doing things, they have excessive sleepiness and just then they have the REM dissociative symptoms. So, could you explain the REM dissociative symptoms?

Michael Strunc:

Yeah, I think your point is well taken and it's one of the things we see all the time, is that when you're busy and engaged, you can sort of mask that sleepiness or underrepresent it. And these other features are really interesting. And again, sometimes they can be misunderstood or are underrepresented by patients. And particularly in pediatrics, these are symptoms that sometimes patients may have, but they may not share that with their friends or even their parents. But those REM dissociative features include one that is classic for patients and almost pathognomonic for narcolepsy with cataplexy. And that is the cataplexy, which is this unusual phenomenon that with sort of intense emotion. And probably for pediatrics, I really make sure my patients understand it's not when you're giggling because Dr. Strunc told you a joke because it might not be that funny, but when your friends or someone who's very funny makes you laugh intensely, that with intense emotion, laughter, anger, surprise, you get physical weakness.

So this can be mistaken as passing out or a seizure, but what really happens is in intense emotion, you get this weakness of your muscles to the point that your head sags, your voice sounds funny, you're wobbling on your legs like they're jelly and you have to help sustain your posture, squat down or lean on something. And it can be something that becomes a habit that you're not quite aware you're doing. And the other REM dissociative events have a lot to do with things that happen around sleep or during sleep. So, as you mentioned this unstable wake and sleep, insomnia itself is fairly common. About a third of our narcolepsy patients have insomnia as a significant symptom. But around sleep, they often have these hypnagogic hallucinations. So as you're getting ready to fall asleep, meaning lying in bed, you have this sense of things going on around you, where you might see or hear things.

So I had a patient just recently who said, "Well, I don't see a lot. Just that little white ghosty figure that goes by my bed once in a while." And he thought that was unusual, but just sort of interesting. And they can also be audio. So I have patients in the pediatric world that commonly will be lying in bed and hear someone talking, or their mom or dad talking to them or someone walking by their bed. And they commonly will say, "Yes, I've gotten up and went to my parents' bedroom to say, what did you want?" And they find their parents asleep. I just had a young lady who said she heard her mom blow-drying her hair once in a while. And she would get up and go, "Why is mom blow drying her hair?" And when she went there, her mom was sleeping. But she hears it. So seeing figures, shadows, hearing things around falling asleep, which again is unusual, but not necessarily that they would mention it.

Richard Bogan:

I think it's interesting that the patients, sometimes they are, one, don't realize it's abnormal and two, they don't necessarily want to talk about it. Sometimes, particularly the hypnagogic or the hypnopompic hallucinations, the vivid dreams, I think everyone has vivid dreams. And then of course, if they have sleep paralysis and they wake up and panic with a sleep paralysis, and think it's an anxiety attack or maybe even sleep apnea. So, these people are sleepy and have REM dissociative symptoms, but oftentimes in pediatrics, these symptoms are disguised and present in other ways. Can you talk about some of the difficulties of diagnosing sleepiness in children?

Michael Strunc:

Yeah, so you're absolutely right. So, one of the things I think that's important in pediatrics versus our adult population is just the scenario where our kids are. So, when I'm thinking of middle schoolers or high schoolers, these are our kids who are... In general, their work environment is at school. And it's also, whether good or bad, is that we have a tendency, I think, to sort of not give credit to our children for their responsibility or the maturity in these situations. So, what will happen in kids is that that sleepiness, one, can be masked by sort of their anxiety or their desire to maintain wakefulness. So, they'll be at school and when they're in math with Mr. Johnson who can be pretty tough, they are sort of anxious, a little bit on edge. They will fight sleep and say, "No, I don't fall asleep there."

And the sleepiness, however, may be sort of ever present. So in pediatrics, I will often say, so if you were at school and there's a substitute teacher, and... We're not getting testing on this material. And you're sitting there and I'm not talking to you, it's not about would you take a nap for an hour. It's would you just doze and start to fall asleep if I wasn't talking to you, or you didn't pay attention? And sometimes there, no becomes a yes, because of that sleep pressure and they're trying to sort of stay engaged can mask that. And one of the other things for sleepiness is, but then kids do fall asleep in situations in school, for example, is what the teacher thinks is, "You got to turn off the Fortnite and the TikTok and go to bed. Turn that off and go to sleep. You're just being irresponsible. Or you're a little bit lazy and you don't respect me as your teacher."

And so, I would tell you that the sleepiness is one, attributed to other reasons, most commonly insufficient sleep and sort of poor behavior, but also commonly misinterpreted as disrespectful or not paying attention. And it's not uncommon that when someone is falling asleep, and then they sort of socially withdraw from activities and their grades fall, what does that sound like? Sounds like you might be a little depressed or have ADHD. So thinking of this as a mood disorder or ADHD and that's why you're not paying attention, although you might fall asleep, is a way that this often can get misinterpreted. So I have lots of kids who come to me with ADHD or mood issues, and then I explain to them when we talk about these REM dissociative features and their sleepiness that is sort of ever present, unless they fight it. They start looking at me like, "Why do you keep asking me these questions? Yes, to all those questions. Yes. What's wrong with me?"

And I explain narcolepsy, they become almost emotional saying, "I knew there was something wrong, because I want to do well in school. I love my parents and my teachers, but I just keep falling asleep."

Richard Bogan:

Yeah, it's frustrating. And, you touched on the ADHD and the irritability and all of a sudden the change in grades at school and all of these things, and mood disorders and all of these things. Point is, can you explore some of the other differential diagnoses? So when you see a patient, you're thinking I've got this patient. One, I need to determine whether they're sleepy or not. We'll talk about tools later on, but as you explore the differential, would you expand on that a little bit?

Michael Strunc:

Well, I have to say probably most commonly, I think of the common things that make any of us sleepy, which again would be insufficient sleep, or in my pediatric adolescent population, an element of delayed sleep phase syndrome. So, kids that have restless leg syndrome or sleep apnea can have sleep that's disruptive and can be sleepy, so other sleep disorders primarily are things that I think about. And I do think that there are kids who I see who have primary mood disorders or ADHD, where sleepiness might be part of that picture.

Michael Strunc:

But again, it's usually the opposite when they come to me. Other disorders, if I think of thyroid disease or anemia or Prader Willi or Kleine-Levin, these are all disorders that I see, but they come with sort of a more complete picture and other symptoms, not just sort of this excessive daytime sleepiness despite what I would say is a reasonable sleep schedule for those patients.

So, sleep apnea is an easy one to look for. Delayed sleep or insufficient sleep are common. Mood disorders as a comorbid feature are common, and other sleep disorders primarily or metabolic or other disorders can occur. Usually though, there's more of a hint in that story that would lead me there.

Richard Bogan:

Yeah. It's interesting because when you get the cataplexy, some of the children have episodes of sudden loss of muscle tone. And of course, a lot of times it's partial, and they quickly figure out what situation causes that so they avoid that situation. But, sometimes they can of course have complete loss of muscle tone. They're still awake is the issue. I mean, they're just lost muscle tone and they may melt into the floor or onto the ground, but I'm saying it worked out for other things. Can you explore those for me?

Michael Strunc:

Yeah, Rick. You're exactly right. And I think you're describing melting how a lot of my patients described their cataplexy. But probably the most common things we see for kids who have cataplexy, partial or complete, would be syncope or seizure. So, thinking that somebody is actually passing out and many of my patients, when their parents have seen it or their teachers or caregivers, if they see it, they think it's some type of a seizure because they're losing tone. They seem like they're not all there. So those are common things that we see. Probably the most common thing that parents sometimes think is it's almost like being just dramatic. They're acting and they're looking for their degree and in theater because of that. But I would say syncope and other issues as far as that, when I think about that for patients, again, hypotension or postural orthopedic hypotension as a possibility, are things that people think about for our patients.

And it's not uncommon that an evaluation with the cardiologist has been done. And it's interesting in pediatrics, it seems obvious, but I always tell my colleagues when they passed out or when they sort of melted, ask them if they were unconscious or they recall the event. And that sort of could clarify that in fact, for cataplexy. They're aware and awake during the event, and that sort of helps clarify that piece if you ask.

Richard Bogan:

Yeah. And then, it's funny. I saw a young child on psychiatry actually, who was making great grades and all of a sudden had an adolescent adjust my reaction and began to see his grandmother rocking at the foot of the bed at night. And his school grades went South. And so, he was having hypnopompic hallucination and was profoundly sleepy, and that's why his grades went South. So, you want to talk a little bit about the hallucinations and the panic attacks or sleep paralysis.

Michael Strunc:

Yeah, absolutely. So, I think the common thing that I think the psychiatry overlap is not just mood, but schizophrenia or depression with psychotic features or panic and anxiety attacks are often things that can be misconstrued with patients who have vivid dreams or come out of sleep like you said, with sleep paralysis and hallucination. So I have many patients who have what sounds like they're panicking, in fact, they are panicking because they had this dream and in the dream, they watched someone invade their house and hurt their sister. They would wake up terrified and they go check on their sister. And it's one of the things that I asked about for the vividness of dreams, because anybody might have a nightmare or a vivid dream. But I always ask my patients, "Have you ever had a dream that was so vivid and realistic that you were pretty sure it was a dream, but you made certain to go check on your mom or your sister?"

And so that vivid reality there can easily be misconstrued as panic or anxiety, or in my psychiatry colleagues who sometimes may not ask more about these details of sleep, they think of this moody withdrawn child or teenager as depressed, but they're having some delusions or hallucinations as part of their depression.

Richard Bogan:

Yeah. So, this feeds into the clinical story. I mean, obviously you're spending time asking these questions and trying to work through this differential, but can you comment on some of the tools and diagnostic techniques that you can use to confirm the diagnosis?

Michael Strunc:

Absolutely. And I'd say in the pediatric world, probably the biggest thing that I recommend for my colleagues who are seeing patients who might entertain this diagnosis, whether it's pediatrics, family practice, psychiatry, is to fill out an Epworth Sleepiness Scale. And we have a pediatric version of that, the Epworth- CHAD, which asks these eight questions. And those questions really ask, "Would you doze or start to fall asleep in each of these situations?" So, I'm sitting after lunch for a while. I'm sitting in front of a TV, sitting quietly in the classroom, in a car for a short ride. So, these are eight questions, and in the pediatric version they're tailored to sort of a pediatric version as opposed to an adult. And essentially, that is a phenomenal screening tool, that is just a number that helps me think that this person in fact does have significant hypersomnia.

So, that's a tool that's very easy. It is subjective. It can be misleading either way, but it's really a useful tool. In addition to that, there is a Swiss Narcolepsy Scale. There's a scale that can be helpful, particularly, if we are asking a couple of questions about cataplexy specifically. And then if I do have that, and that screen is positive, and I'm thinking about narcolepsy, obviously for testing we have really two options. And one is, the standard sleep study followed by a multiple sleep latency test, and then the other one that we have, and we've had it for, I guess, about a year or so now, is commercially available looking at CSF hypocretin or orexin. And in narcolepsy with cataplexy, as you know, those numbers are typically quite low in almost everybody. So, that's a test that we're using much more often to try to confirm a diagnosis.

I'd mentioned that when we do the sleep study followed by the MSLT, though it seems pretty easy, it can be fraught with err in pediatrics. And that really is for a couple of reasons. One of those is that if I have a patient who's on a medicine, say a psychostimulant or a mood altering agent, that may affect their wakefulness, their sleepiness, or their tendency to go into REM during one of those naps.

Michael Strunc:

The second thing is those patients, my pediatric patients, sometimes when they've had a sleep all night and they're going to do that nap test, and they're sitting in a room with wires on their head and someone looking at them and a camera, and they stopped their mood agent three weeks ago, they're really anxious. So much like when they're sitting in the classroom, watching the professor and they don't want to get busted, they're anxious.

And so their ability to naturally fall asleep is altered. So I can have a false positive or false negative. Probably the patients that can fool you with an MSLT that would be positive, is that teenager who typically you didn't know is going to bed at three or four in the morning and getting up at 10. And now he's taking his naps during his normal sleep period, and he looks like he has numbers that are positive for narcolepsy. So, it's a very useful test. You just have to be careful do it appropriately, so those numbers are more valid when you see that patient.

Richard Bogan:

Yeah, I think of it... I mean, you're touching with these diagnoses, or diagnostic techniques. I mean, obviously we know certainly in type one that there's an auto immune abnormality that injures those hypocretin neurons. So we have a hypocretin or orexin deficiency, which causes this state instability and oftentimes talk to the patients and the parents that, "We're trying to see how your brain controls wakefulness and how it controls sleep." So we do a sleep study, make sure nothing's going on. They are breathing, legs, et cetera. And then we do the nap studies just to see, and children are interesting because they do have state stability. And even though they have state instability and narcolepsy, so the MSLT can be misleading. But all of this feeds into our diagnostic criteria, which is sort of our dictionary of how we make the diagnosis. And you touched on type one and type two narcolepsy. Can you explore that a little bit of the two diagnostic international classification of sleep disorder, volume three. These two, and how that relates to the DSM-5 diagnosis of narcolepsy?

Michael Strunc:

Yeah. So I think that the ICSD-3 did a nice job of just trying to split these out and help us. And like you said, we sort of have a better sort of understanding of clearly these pathophysiology and narcolepsy type one, or narcolepsy with cataplexy. So, our criteria for those patients is, one, the clinical history. That is the sleepiness, excessive daytime sleepiness, along with the REM phenomenon, specifically having cataplexy. And with those patients, then either they have that CSF hypocretin that is quite low, or they have that PSG and the MSLT that meet the numbers that would suggest narcolepsy with cataplexy. So, I mean sleep latency of eight minutes or less, and REM on two of those five naps. The one thing about that that is useful I think that we pay attention to now, is that on your overnight study, if you enter REM within 15 minutes of your overnight study, that counts as one of those REM onsets. And so that's really helpful.

In narcolepsy without cataplexy, what we have is essentially an MSLT that would have those numbers, but you do not have the presence of cataplexy. And of course, the CSF hypocretin is not reliably low if I would check that for those patients. So I think pediatrics much like adults, most of my patients, narcolepsy is with cataplexy probably 70%. But I have a large number of patients where they have a story that's compelling, but don't have cataplexy. And that makes it a little trickier. And like you said, it's maybe not as clear cut when we're talking about narcolepsy without cataplexy, and that pathophysiology may be a little less clear for us as opposed to the kids who have narcolepsy with cataplexy.

Richard Bogan:

So we have DSM-5, you want to comment on that?

Michael Strunc:

Yeah. So DSM-5, I guess, is sort of a little broader. And one thing I like about the DSM-V is that, one, they basically say you have to have air pressable sleepiness over a few months, most days of the week, narcolepsy with cataplexy. If you have cataplexy clinically, that really is the diagnosis. And then you have sort of the alternative of either REM within 15 minutes on that overnight study, or that MSLT that meets those criteria we just talked about. And what I just like in the DSM-5, they talk about in the description of sleepiness, this irrepressible sleepiness that's there multiple times a week, throughout the day. And I think clinically, that's that sleepiness that really wants to lead you to that diagnosis.

And so, we have a number of tools looking at either sets of criteria that can help us clearly make that diagnosis. It's also just important that ... Plenty of patients, their clinical story may not quite fit perfectly for our criteria, and so, sometimes that means you might have to revisit testing again, or you might have to revisit the classification and see, "Do I meet these criteria now?" And that's true in pediatrics, just like it is in adults.

Richard Bogan:

Yeah. I think when you get into a situation where you have a lot of co-morbidities and you're really more clinical, the DSM-5 sometimes will guide us. And you mentioned the short REM latency. Normally, as you well know, REM latency takes a long time for the brain to start dreaming, typically 60 minutes plus. And when we do a sleep study and we see someone pop into REM sleep pretty quickly, that's highly specific for narcolepsy. And if it's less than 15 minutes, and of course on our nap studies we're looking at that, REM onset in the daytime and a short period of time. So for that Mike, thank you. You've outlined that very well. Now we've made the diagnosis, now what do we do?

Michael Strunc:

Well, so I'll tell you again, in the pediatric world, I'd say the first thing from my patients, is I sort of let them know that you have this neurologic disorder and that it's not going away. And I'll tell you for my patients and for their parents, it is sort of a double-edged sword, they're frustrated, upset, nervous, scared about this diagnosis, but often they're very relieved to know that over the last year or two or three, while you were failing in school, and then your mood was down and you withdrew from activities, it wasn't just that you were lazy or depressed. That there actually was something else going on. So first, you have to realize that this is a disorder that's not going away. And what that means, is when we're talking about treatment, it's not a sprint, it's a marathon. So when I talk about treating narcolepsy with cataplexy in my patients, I tell them it's sort of a several step process.

And I give them sort of three big areas because I like to try to put this into pieces for my patients. So number one, is education. I mean your education. So when you come back and see me in three months or five months, I'm going to ask you, "What is narcolepsy?" You better have an answer. So we have lots of resources. We think about any of our big sleep centers or National Institutes of Health or WebMD or Narcolepsy Network or Wake Up Narcolepsy. There are a lot of web based, educational based, nationally based sites where you can get education and materials, and I give them a lot of material as well. So, it's learning what this disorder is and what it is for you. The second thing, is really what that means for you right now. And what I mean for my patients is, this has a lot to do with sort of the decisions you make for your life, and we're going to have to talk about that.

Michael Strunc:

So as opposed to your colleagues and your friends, you're going to have to have a structure to your sleep and your night and your day, that your colleagues may not really stick to. It's really important because as you said, you have such unstable wake and sleep that we need to sort of put some stability just with your schedule, and that might mean a set sleep schedule. It might mean a scheduled nap or a time for a nap, but just having organization to that is really important. And then I talked to them about sort of mood issues and comorbid features, which are very common and making sure I want to address those things. If a mood disorder, anxiety, or depression lives with your narcolepsy, we ignore that at your peril, my peril, and not treating you adequately.

So we want to pay attention to that. And when it comes to going to school, your teachers, therapists, the school nurse, they all need to understand that you have this diagnosis because we will make accommodations for you at school. So the teacher that thinks you're lazy will understand you're not lazy, you fell asleep probably because of narcolepsy. You're going to have some more time to do that exam when you fall asleep in the middle of it, because of this disorder that you have. That is not just a failure on your part to turn off TikTok when you went to bed. And then I'd say the last big piece of this, is pharmacology. And so, there's really no way to adequately treat narcolepsy with cataplexy without using medications. And those medications come in sort of several varieties or several categories, but the entire world of medications for narcolepsy that are approved in adults and kids, and the ones that aren't FDA approved but we use commonly, is not 60 or 70 agents.

It's really a small bucket of agents in several categories. And so when it's a marathon of treating narcolepsy, I'll tell my patients just about everything I have here. We probably want to think about trying over time since this is not going to go away, and I'd like you to be able to tell me in a couple of years, "Dr. Strunc, stop talking. Please just renew my medicine. I take this medicine, I use this one sometimes, and I rarely use this when I'm driving." And I'm like, "You got it. I'm just here to help facilitate your plan because you're in charge of your narcolepsy."

Richard Bogan:

Well said. Do you want to review some of the FDA approved drugs that are available?

Michael Strunc:

Yeah. So, I said in pediatrics, we really have a limited options for what's FDA approved. So there are drugs that are used in pediatrics that are FDA approved for other indications, but not specifically for narcolepsy. We might touch on those, but if we talk about FDA approval and down to age seven, sodium oxybate is a drug that is approved. And there is a new agent that is a low sodium version of that agent that has also approved recently. So, sodium oxybate is an interesting medication. It's very unique. It really is the only drug, or it and its colleague are the only drugs that are in this class. Different than psychostimulants, different than other mood altering or wake promoting agents. And this is an agent that's taken at night. It is a liquid, it tastes sort of salty. Of course this newer version has less sodium in it, but it's required to be taken twice at night. You have to not eat for a couple hours and then take it and lay down in bed. Then you have to take it again two and a half to four hours later.

But what this agent does, which is quite unique, it sort of makes your sleep itself more consolidated, and I would say healthy. So, that sleep when you wake up in the morning, the agent, this drug is long gone from your brain, and yet you wake up feeling rested and sort of ready to wake up. And in fact, though it consolidates sleep, it also decreases these REM phenomenon. And so it also decreases cataplexy and the REM phenomenon that we see. So it treats the EDS effectively. It also treats these other phenomenon very well as a single agent. And in fact, it's the only agent that actually treats both of those categories of symptoms by itself.

Michael Strunc:

So by far, that's the most powerful agent, but one that has to be used appropriately, and you have to know how to use that safely in your patient. Beyond that, the other agents that we can use for wake promoting are either psychostimulants or modafinil. And again, if I'm talking about pediatric approval, we're sort of outside that window, although the psychostimulants are used routinely for ADHD in our children, and we have vast experience with using those. And those agents are not really treating cataplexy or REM phenomenon, but they are very effective and they have their own sort of bucket of side effects, but very effective as agents that help with the wake promoting benefits or for the EDS. And then there are some medicines that are newer agents in adults. We have solriamfetol and pitolisant that have been approved. Those are not approved in children, but are different agents that work in sort of different systems of your brain. And there are agents that are outside of these typical medications that are mood agents, for example, that might affect, for example, the REM phenomenon specifically in our adults and in our pediatric patients specifically.

Richard Bogan:

Yeah, well said. I mean, I'm in the adult population, but these new drugs, pitolisant and solriamfetol, those work downstream from orexin so it can be histamine mediated, or dopamine norepinephrine reuptake mediated. So, the neurobiology, the patients begin to learn that. And of course, this is in the adult population. Pediatrics, these drugs, as you well know, have not been studied in the pediatric population yet, so...

Michael Strunc:

Yeah, you're exactly right. This is a frustration I would say in the pediatric world, is that we have agents that are approved in adults and not approved in children. So in a way, it's an argument that we should maybe study these agents in pediatrics. But I'll tell you in the pediatric world, anybody who takes care of pediatric patients knows very well as I do, that's not going to be happening tomorrow. And we are well versed and very comfortable using agents that are not approved because that's just the world of pediatrics. You just want to make sure that you use them appropriately, safely, that your patients are well aware of how to use them appropriately, but it's simply the way that world is in pediatrics. And I would say, every agent we just mentioned, I've used all of those in my pediatric patients with great efficacy.

It's just a matter of sort of making sure that you know how to discuss what options you have for kids, and realizing again that this is a marathon when it comes to narcolepsy. And if you're 15, this is a long time that we're going to treat this. And in fact, there will be other histamine orexin agents coming down the road, and they will eventually be agents that likely to get approved in the pediatric world. So, it's sort of a moving target, but something we just have to sort of take in stride and work to help our patients be happy and successful.

Richard Bogan:

Well, listen Mike, thank you very much. I really liked the emphasis on education, and the children and the parents understanding what these drugs do. The pharmacokinetics and the pharmacodynamics of the drugs and the educational aspect. The best thing for sleepiness is sleep. And, your emphasis on the education and the behavior are really important. So, review of the diagnostic criteria for pediatric narcolepsy, as well as the safety and the efficacy of the FDA approved drugs, and now, of course the new JZP-258, the low salt preparation, oxybate preparation, all of this is phenomenal and I thank you for that. So let's close with our smart goals, specific, measurable, attainable, relevant, and timely.

Richard Bogan:

So what should healthcare practitioners listening today take away from the podcast? So, on each visit, ask your patients or their parent or caregivers if they're sleeping during the day, use validated tools as Mike said, and develop treatment strategies that are beneficial to our patients.

So to receive CME credit, CE credit, click on the link identified here to complete the post-test and evaluation online. And I, personally, would like to thank you for joining us today and please visit the sleep disorders hub at cmeoutfitters.com sleep disorders-hub for additional educational activities and resources. We have other CMEOcasts about sleep disorders. So, thank you for joining us today for episode four of our four-part CMEOCast series. To view additional episodes on a deeper look into EDS, "Matching Treatment Choice to the Path of Physiology of Sleep" and "Differentiators when Choosing Novel Treatment Options for EDS," please visit www.cmeoutfitters.com. Thanks again. And thanks, Mike.

Michael Strunc:

Thanks, Rick.